ANNALS OF SURGERY

A Monthly Review of Surgical Science and Practice.

Edited by LE

J WILLIAM WHITE

L.D. of New York.

MACEWEN M D LL.D.

CSLASGOW

S.

·~

ORIGINAL ME

- I The Anatomy and Surpery of the Internal Derangements of the Ance Joint Based an Study of 150 Dissected Joints and the Literature By Benjam a Tenury W.D. It Sorie Remarks on Temoraco the Chissan
- With a Proposal how to reach the Same
 hy Operation By Otto G T Kiles M D 35
- III Primary Cholecystectomy; Scope Method and Results Conclusions from Portlytwo Cases in the Practice of the Author By Howard Life eathal M.D.
- IV Primary Sarcoma of the Spicen and he Treatnent by Spiencetomy By Hall me Jepton M.D. P.A. C.S. (E.f.) and Frederick Albert 315 3170.
- \ Hernia of the Lierus through the Inguland Canal Ly John Hon and Johnson MD 97
 \[Source of the Brachlai Artery By Gaslow Torrance MD 107
- VII Pyzemic Glanders in the Human Subject keport of a Recent Case of Laboratory Origin terminating in Recovery By J. Clark Stra or M.D.

TRANSACTIONS OF THE NEW YORK SUROICAL SOCIETY

- STATED MEETING February 24 1904 1), 114 STATED MEETING Varch 9 1904 213
- TRANSACTIONS OF THE PHILADELPHIA ACADEMY OF SURGERY
- STATED MEETING March y 1904 135

REVIEWS OF BOOKS

Beck Rivinger Ray Diagnosia and Therapy 156
Here Progressive Medicine 157

CORRESPONDENCE

Certa n Points in Suprapol ic Prostatectomy 159

Laipe of Peroxi le of Hydrogen 160

Published Monthly by J B. LIPPINCOTT COMPANY, Philadelphia, Pa.

TEAT BRITAIN: CASSUL & CO., LIMITED, ADSTRACASTA: CRAS. MARRIEL & CO., INC. DOSDOR.

Prior in United States, \$5.00 a Year in Advance. Single Number, 36 Conts.

THE POST-NAUSEA OF ANESTHESIA

can be fully controlled by using

INGLUVIN

The most dependable remedy for all stomach trouples.

Valuable as an adjunct in Calomel administration.

Highly successful in relieving the Vomiting of Gestation.

WM. R. WARNER & CO.

PHILADELPHIA

NEW YORK

CHICAGO

NEW ORLEANS

A STEP FORWARD

in the Summer treatment of any disease condition is attained when the gastro-intestinal tract is made docile, receptive and retentive. That's why

GRAY'S Glycerine TONIC comp.

is indispensable in pulmonary tuberculosis, nephritis, gastro-intestinal catarrh and infantile diarrhoea

THE PURDUE FREDERICK CO.

208 Broadway, New



Returning From California

Make sure your ticket reads
Shista Northern Pacific
Route A beautiful journey
up the Pacific coast to Portland
sthard over the great trans
nental highway on the
Coast Limited a train

Shasta the way—Mounts
Shasta the Helens Adams
Rainiér and the Cascade and
Rocky Mountain ranges

Comfort all the way if you select the Northern Pacific Shasta Route The best of ser vice Northern Pacific dining car meals are famous

Any information from 1 W Pummill District Passenger Agent 711 Chestnut St. Ihil adelphia Penn. You have only to ask.

Northern Pacific

Railway

A. M Cleland, Gen Passenger Agent,
St Paul Minn



Christmas Cheer for the Nurse

Do you know of a nurse whom you would like to make happy on Christmas Day?

Perhaps she is a relative or she may be the angel of mercy who follows your directions implicitly and in whom you place the greatest confidence and trust in the care of your most critical exist—no matter she will be a very grateful girl if you Il let us conspire with you to make her happy. You send us a check for two dollars and w will do the rest—do it handsomely too

Christmas is a day of good cheer for all—why not for the nurse most

of all instead of least of all.

First we II take a copy of the best
nurse s journal we know of (that s
the December American Journal of
Nursing) and do it up in a pretty
Christians parcel tied about with
holly green tape. Then we II write
a Christians label and stick it neatly
on the wrapper and send prepaid so
that on Christians informing it will
reach her. We II also send her a
tasteful card of greeting saying who

a year's subscription to the American Journal of Nursing for the most deserving nurse you know

We print the December number early and only print An enough for the orders on hand 50 BF SURE TO HAVE 10UR OR

DER INCLUDED

Paint
Enclosed find
Enclosed find
the Month of the Month
for one year to the
following address.

an e____

Addrew_

JOURNAL OF THE Association of Military Surgeons

of the United States.

EDITED BY

James Evelyn Pilcher, M.D., Ph.D., L.H.D.,

Major and Brigade Surgeon of United States Volunteers, ''
Captain, Retired, In the United States Army.

Military and Naval Surgical Practice

The Medicine of **
the Army and Navy







Field, Camp and & Marine Sanitation&

Tropical and Temperate Diseases

The Journal of the Medical Officers of the American Public Services in Particular, but of the Highest Interest and Value to Every Practitioner.

Published Monthly, \$3.50 a Year.

Free to Members of the Association of Military Surgeons of the United

The Association of Military Surginal

DEPARTMENT OF PUBLICATION,

THE PURDUL REDERICK CO.

208 Broadway, New

Annals of Surgery

Vor. XI.I

JANUARY, 1905

No 1

ORIGINAL MEMOIRS.

AN ADJUSTABLE METALLIC INTERDENTAL SPLINT FOR THE TREATMENT OF FRACTURE OF THE LOWER JAW.

WITH REPORT OF CASES IN WHICH IT HAS BEEN APPLIED BY THE AUTHOR

BY RUDOLPH MATAS, M D ,

OF NEW ORLEANS, LA,

Professor of Surgery in the Tulane University of Louis and Surgeon to Chanty Hospital

The ideals aimed at in the treatment of fracture of the lower Jaw are 1. To reduce the fracture accurately 2. To maintain reduction and immobilization of the fragments until firm union is obtained. 3. To provide for the hygiene of the mouth, which suffers constantly from salivary stagnation and puth decomposition. 4. To meet the preceding indications with the least interference with the oral and maxillary functions (feeding and speech).

To satisfy all these desiderata fully and without some sacrifice of the last two conditions is evidently impossible in all cases, and the manner in which these indications can be met will depend upon various circumstances, among which the most important are the extent and siturtion of the fracture, which are alone sufficient to determine whether the fracture can be successfully treated by partial or total immobilization of the

¹ Read before the American Surgical Association, June 1904.

jaw. It is evident that if the functions of the temporomaxillary joint are not interfered with and that the fracture line can be kept at rest during repair, thus permitting the patient to open and shut his mouth at will, that the cleanliness of the mouth and oral functions (feeding and speech) will be maintained with a minimum of discomfort to the patient.

One of the most notable advances in the treatment of fractures is the tendency to diminish, as much as possible, the period of functional disability during the process of repair. The aim of the surgeon is to secure the conditions necessary for perfect osseous union with the least interference with function. This is well exemplified in the ambulant treatment of fractures of the lower extremity, which provides for the conditions necessary to perfect bone union without seriously restricting locomotion. If this is true of fractures of the extremities, how much more important and desirable it must be to preserve the functions of the jaw during the process of repair when this bone is fractured! The serious consequences of the functional disability of the lower jaw, caused by fracture, are manifested, not only by interference with the speech and feeding of the patient, but more particularly by the disastrous effects of salivary putrefaction and oral sepsis, which have given this fracture a special interest to the surgeons of all times. Apart from this, the actual technical difficulties encountered in maintaining the apposition of the broken fragments during repair are, in many cases, very great and account for the vast amount of mechanical ingenuity and thought which has been expended on the subject by succeeding generations of medical men from the days of Hippocrates and Celsus to the present time. That the problems involved are real and have challenged the ingenuity of the best minds of the profession is best told by the bibliography of the subject. A hasty glance at the Index Catalogue of the Surgeon-General's Library, including the second series, Vol. viii, 1903, shows references to over 250 articles on fracture of the lower jaw. By consulting these references and other sources of information, we have collected the descriptions of over seventy-five different appliances, devices, and

methods of treating this special fracture. This list, which is very incomplete, is made up largely of the contributions of the surgical writers of the eighteenth and the first half of the nineteenth centuries The bibliography of this fracture is a monumental repository of the progress of surgery, in which are found, almost in chronological order, the illustrious names in surgery of all the ages. In looking over the list of appli ances and references to the methods of treatment which have been employed in the past, we are struck by the fact that almost every one of the mechanical devices and methods of treatment at present in use, and regarded as new by our contemporaries. find their prototypes in ancient publications and have been known and applied, at least in principle by old and forgotten authors Apparently the present generation has only succeeded in resurrecting old principles and applying them again in a modernized garb Real progress has undoubtedly been accom plished by adapting to the fundamentally correct ideas of the older authors the improved technique of dental mechanics and prosthetics, by using better material and appliances for taking impressions of the jaws, thus improving the quality of the interdental splints which are still necessary in some eases, but, apart from this, we fail to find anything essentially new in our modern armament * To the student of this subject and to the experienced surgeon, it is evident that, notwithstanding the multitude of resources and abundance of appliances, no single method or device will avail for all cases and that a certain eclecticism and judicious selection of methods must be exer cised in order to obtain the best results in individual eases. No one will deny that the most perfect results would be obtained in all cases by the collaboration with the surgeon of a dentist skilled in the methods of oral prosthetics and dental mechanics. but as this is practically impossible in the urgent conditions in

^{*}In further confirmation of this statement see the erudite monograph by Beranger Feraud (L. J B) Traite de lummoblisation directe des fragments osseux dans les fractures, Paris 1870 and the encyclopædic article by F Guyon entitled Maxillaire (os) Pathologie in the Diction naire Dechamber, Tomes fine deuxieme sere 1872

which these patients present themselves to the surgeon for treatment, it is proper that the simplest methods available to the general surgeon, with the material at hand, should be utilized, at least, in the first or provisional dressings. Fortunately, a great many of these fractures are simple, and the tendency to the displacement of the fragments is so slight that recovery has been known to take place without any sort of treatment whatever. Boyer reported a case of a water-carrier, who refused to be treated with any restricting bandage, and recovered with very slight deformity, notwithstanding that he used his jaws in chewing, eating, and drinking as usual; and, also, another curious case is reported by A. Bérard, that of a child, whose fractured jaw would not unite until all the immobilizing appliances had been removed, when union quickly took place (Guyon). Of course, these are exceptional cases, which, by their very rarity, emphasize the rule.

In the Charity Hospital of New Orleans, where twelve or thirteen cases are treated annually (in the last twenty months, up to October 1, twenty-five cases of fractured lower jaw were admitted), a large proportion of these patients are treated in the clinics by immobilization with a chin-piece of moulded material and a Barton bandage; fully ten out of twenty-five cases were treated exclusively by this method and apparently with fairly good functional results. In these cases in which the lesions of the mucosa and the soft parts are comparatively insignificant and the tendency to displacement is slight, the patients, who are usually of the laboring class, usually suffer comparatively little pain and stand the privation from solid food with resignation and cheerfulness. In this class of patients the immobilization of the jaw by chin-splint and a sling or head bandage is not absolute, and soon allows of a certain amount of separation of the jaws, which favors the cleansing of the mouth by irrigation with antiseptic solutions and permits comparatively easy alimentation with liquid and soft foods.

On the other hand, there are many cases of single and multiple fracture, in which the tendency to recurrent displacement

after reduction is most obstinate. in these cases the damage to the buccal mucosa is considerable and the tendency to buccal sepsis and submucous infection is great. It is in this class of fractures that the most perfect coaptation is desirable with the greatest freedom of access to the interior of the mouth for purposes of disinfection These are the nationts who have furnished the material for the greatest number of inventions, and, even now, offer problems which tax the originality and resources of the practical surgeon and the dental specialist Tudging by the current literature, they are still fruitful material for discussions in journals and societies * It is fortunate that the majority of these fractures occur in the mandibular arch, in front of the angles and within the line of the teeth, and that it is possible, in many of these, to immobilize the fragments without interfering with the movements of the temporomaxillary ioint

In fractures of this class, if the teeth are strong and firmly implanted the broken fragments may be held in place by the old Celsian plan of wiring the adjoining teeth, using them as binding posts. This method, which has been perfected and modernized by Angle and Lohers, who use clamps and bars to lock the teeth together, is only rarely applicable because the teeth are either loosened by the injury or subsequently mobilized by the strong traction of the inus and muscles at the line To obviate this difficulty, the peridental wire splints of Hammond, Sauer, and Martin (of Lyons), and the fracture clamp of Shotwell have been devised and applied with success by their advocates, but, as they require special skill in their application and they also offer comparatively little resistance to muscular traction, are only applicable in certain favorable cases Far more accurate and reliable are the moulded dental splints which fit over the crowns of the teeth following the contour of the dental arch, they are made of metal, hard rubber, or vulcanite, cast on moulds of the teeth out of plaster-

^{*}In the Index Medicus will be found references to fifteen separate articles on fractured lower jaws which have appeared in journals and society transactions from January to September, 1904

of-Paris impressions. These dental splints were originally suggested, long ago, by Fouchard, Prestat, Malgaigne, Morel-Lavallée, and have been modernized and perfected by Kingsley, and before him by Gunning, Hayward, Bean, Moore, Lonsdale. Hill, in this country and England; by Martin in France; by Weber, Suersen, Haun, Anton Witzel, and quite recently by Warnekros and Kersting in Germany; but all these, while admirably meeting the conditions in the hands of their inventors, have a disadvantage that they require the assistance of specialists in dental mechanics, whose services are not always available at the time when these cases are brought to the surgeon for treatment; and even when the specialist is available, they often require much time and many trials for their preparation and application. Nevertheless, there are many cases in which splints made from casts are required in order to make them fit accurately over the dental arch. This is particularly true of those cases in which the contour of the dental arch is made very irregular by the loss of several teeth at different points, or in those cases of partial fracture of the jaw in which a large section of the alveolar process is broken, carrying with it a number of teeth which wabble constantly with the fragment of bone to which they are attached.

We purposely exclude from consideration in this connection the comparatively rare fractures of the rami, of the condyloid, and of the coronoid processes in which no interdental immobilizing appliances, as a rule, are applicable, and in which the suppression of all jaw motion is absolutely mandatory as an essential to repair. Neither shall we consider those extreme cases of multiple comminuted fractures of the jaw which result from gunshot and railroad injuries and other forms of violence in which the number and mobility of the osseous fragments, together with the enormous damage done to the soft parts, precludes all possibility of using any device which requires some fixed point of support for its successful application. In such instances, the question of immobilization and osseous repair is secondary to the more vital and pressing demands of drainage and asepsis; the correction of deformity

•

and impairment of function being relegated to a secondary plane in meeting graver complications

Therefore, if we leave out of consideration the two extreme groups of jaw fractures, i.e., the very simple, with little tendency to displacement, on the one hand, and the very senous, compound, multiple, and complicated cases, on the other, in which no sort of restraining apphance is available to prevent deformity, etc., there is still the middle class, previously referred to, which it would appear desirable and advantageous to treat by some ready method that would satisfactorily meet the requirements of asepsis and repair with the least discomfort to the patient

The presence of a considerable number of these troublesome fractures in a large hospital service has, for many years, impressed me with this need. I have felt the want of an appliance which could be adapted to the conditions which we find in a great number, if not the majority, of these patients, and which could be readily and successfully adjusted by any medical man with ordinary surgical training without the need of calling upon a specialist in dental or oral mechanics for its application.

While the idea of a universal splint for fractures of the lower jaw that will fit all patients is, of course, absurd, it is not unreasonable to hope that a comparatively simple contrivance can be devised which will be serviceable in a large number of the more common types of this injury, as they present them selves in our clinics. Reasoning from the data of experience, which show that this fracture occurs chiefly in men (90 per cent), that it occurs in the adult (dentulous) period of life, from the twentieth to the fiftieth year (in the last twenty-five cases of this fracture attended in the emergency service of the Charity Hospital of New Orleans, the average age of the patient was twenty three years), and that fully 90 per cent of these fractures occur in some part of the anterior or projecting segment of the maxilla in front of and including the angles, it is not a vain hope that by a proper selection of material a splint

may be devised which will permit of adaptation to a large number of these patients.

That the same need has been felt by others is very apparent in the writings of the older surgeons of the past century. Bush (1822), Houzelot (1826), Joussett (1833), Malgaigne (1847), Morel-Lavallée (second appliance, 1853), Rütnick, Kluge, and others too numerous to mention, all thought of appliances which acted more or less on the same principle, i.e., that of a clamp which held the broken fragments of the jaw in the grip of a plate fitted over the teeth, and an extrabuccal piece, which was adjusted over the chin. variety of models were thus designed, made of various materials; some of them very ingenious and no doubt useful in the special cases in which they were applied; but they all appear to have failed in some essential, which was necessary for general utility, as is shown by the fact that they have never retained a permanent place in the armamentarium. The chief defects that can now be recognized in these older splints is in the use of material in the dental plates which lacked adaptability to the numerous variations and conditions of the dental arch which are met in fractures.

In later days this objection has been overcome, as far as individual cases are concerned, by the use of moulded hard rubber or metallic splints, which are moulded or cast over plaster impressions of the dental arch of the particular patient for whom they are intended. These dental splints may be quite sufficient in themselves, as stated previously in this communication, to hold the broken fragments in position, or they are attached to outside bars or braces, which project from the mouth and hold the dental plate firmly to an adjustable chinpiece. In this way the primitive and crude models of Rütnick, Morel-Lavallée, and others have been modernized through the efforts of the dentists of the present day, notably by Kingsley and a host of others in this country; by Martin, of Lyons; by Lohman and A. Witzel, and others in Germany. The objection to these, however, from the point of view of the surgeon who has to deal most often with these fractures in large surgical clinics, is that they fail to meet the requirements of emergency and charity practice. These patients, as a rule, apply first to the general surgeon whose duty it is to meet the indications as thoroughly as possible. If the patient is to be transferred to the care of a dental specialist, days must pass before a perfectly fitting splint can be attached, in the meantime, if the displacement is not properly corrected, the patient suffers great hardship

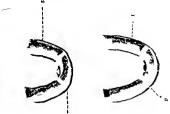
As far back as 1897 I had occasion to exhibit to the Or leans Parish Medical Society (vide Transactions of this society for 1807) a modification of a metallic splint, devised with the objects previously stated in view, by Dr Robert C Ackland, of St Bartholomew's Hospital, London, and described by him in the British Medical Journal of April 1, 1803 At that time the splint appeared to meet the conditions of the average adult case of fracture of the raw, theoretically, quite well, but, with in creasing experience. I had to abandon it, because the dental mouth piece, which fits over the arch of the teeth, was not flexible enough to permit its adjustment to the numerous varia tions of the arch that are met in practice, neither was the chin plate adjustable to the various degrees of prognathism, more over, the projecting twin bars which connect the dental plate with the chin piece not only interfered with the sphincter functions of the month, permitting the escape of fluids and dribbling of saliva, but they caused deep ulceration at the angles of the mouth and so much distress to the patient that it had to be aban doned. For a while we tried other methods and also resorted to the suture of fragments in the multiple, compound, and more difficult cases, but the results have not justified the general adoption of this method, except in a few selected cases admission last winter of a number of fractures of the lower jaw in our clinics, in which the tendency to displacement was very marked led us again to experiment with a new metallic splint While this splint is not in the least new in principle, it is original mal in its construction and in the combination of different sug gestions from various sources which we have found of value in

overcoming the practical difficulties which we have encountered.

[The description that follows applies to the latest improved model, which we have tried only in one case. The first five cases reported at the end of this paper were treated with the first two models in which the dental piece or gutter was permanently fixed to the clamp and was not provided with the Wiley cuts, which make the present dental splints so much easier of adjustment to different jaws.]

The splint is constructed on the principle of a clamp, which holds the entire projecting arch of the jaw (from the chin to the angles) firmly in the grip of a flexible mouth-piece, which fits like a gutter over the entire dental arch; and, of an external plate or chin-cup, which extends from the symphysis to the angle. The mouth-piece and chin-plate are both detachable; the chin-cup is made adjustable to various degrees of prognathism by a sliding joint fixed by a pin and thumb-screw. The appliance, therefore, consists of three component parts, the details of which are as follows:

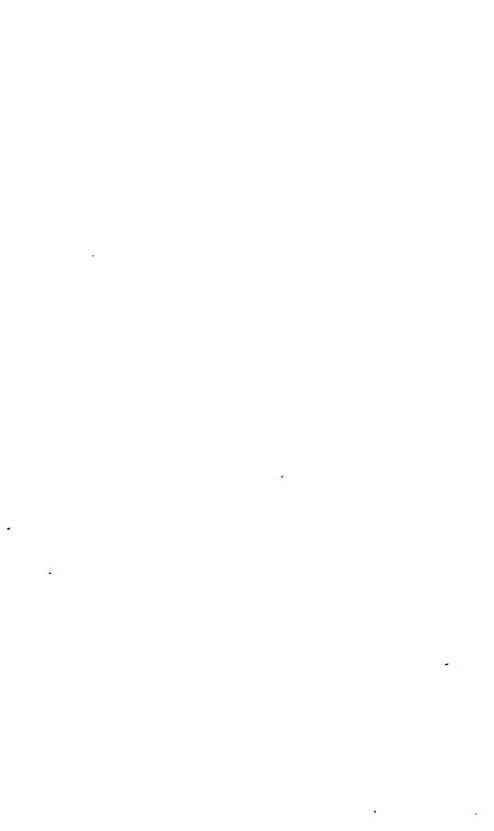
1. The mouth-piece or dental splint proper. This is horseshoe in shape, and in the latest model is made after the pattern of the impression trays used by dentists to take casts of the lower dental arch. It is hollowed in three planes to fit loosely over the crowns of the teeth, the groove or gutter broadening from before backward to correspond with the increasing diameters of the molars. The edges of the splint form two flanges or rims which project downward; the outer flange extending to the neck of the teeth on the outer or buccal side; the inner flange or rim dipping to a lower level almost touching the gums on the inner or lingual side. This dental piece is made of block tin and is indented approximately on a level with the bicuspids by two deep cuts which penetrate the gutter to its outer rim, leaving a narrow wedge-like space, which is closed at the apex by the outer or labial rim of the splint. These cuts were originally suggested by Dr. J. K. Wiley to increase the flexibility of the dental impression trays in making impressions of the



to the contour of the jaw and teeth the ad which allows each mouth piece to be adjusted nrigularities of the tecth is overcompractice. In this was loose teeth are held in compound of dental wax used in denta (1 ig z) can be lilled with the soft moniding The hollow groose in each month piece Wiley in the manifacture of the adjustable cutting partial sections (a a a") iii each justment and adaptation of these splitts to No 3 small size for children In addition place the mobility of the splint is reduced mouth piece as suggested by Dr G h to the softness of the metal used (block tm) unitoria compression caused by the vertical mpression trava use I in idental practice ndividual cases are further obtained by or adults. No 2, we then the for jouth applied with each splint. No 1 large size if three detachable and interchangeable

Figs 1 and 2 -Superior and inferior views





lower jaw The softness and flexibility of the metal of which the splint is made, together with the Wiley cuts, allow the operator to adjust the splint to the varying contour of the lower dental arch as it is met in different individuals

After studying the dental arches and maxillary contour of fifty different persons of both sexes and various ages, from the fifth to the sixtieth year, I had the splint made in three different sizes the smallest for children, the medium size for youths and young women and the largest size for full grown adults From these different sizes a selection can be made to fit the jaw of almost any normal individual who is likely to suffer from this injury

In addition to the ease with which the splint can be moulded to the outline of the dental arch, the breadth of the gutter can be increased and otherwise altered by stretching the flanges and modelling them with a pair of ordinary hand pincers. The dental gutter is also provided with a deep groove or slot in the centre of its inner or labial surface, which fits the hook at the tip of the clamp and holds it very firmly in position when it is locked. By this arrangement the splint is easily attached to the clamp after it has been adjusted to the law.

- a The chin piece is made of perforated aluminum and is shaped to fit the contour of the jaw. It can be moved back ward and forward on a sliding joint, which is adjusted by a thumb-serew and is attached to the lower limb of the clamp In order to prevent injurious pressure on the skin of the chin, it is padded with cotton widding, covered with a layer of gauze, smeared with oxide of zinc ontiment
- 3 The clamp which holds the mouth and chin pieces to gether is made of soft steel and consists of an upper and lower limb screwed together at a considerable distance in front of the mouth. The upper limb projects from the middle of the mouth and is curved over the lower lip so as to allow the mouth to be closed, a very necessary provision to prevent salivary dribbling and to permit a complete control of the mouth in drinking and eating. The pressure required to hold the jaw firmly in the grasp of the intra and extra buccal pieces is obtained by

a screw attached by a swivel-joint to the upper limb of the clamp, the pressure being regulated by a thumb-screw, which acts on the lower limb of the appliance. (Fig. 3.)

Application of the Splint.—The chief object of this splint is to immobilize the broken fragments of the jaw without restricting its movements as a whole, thus permitting the mouth to be opened and closed at will. It is especially intended for compound fractures of the maxillary arch (symphysis and body), whether single or multiple, in which there is a marked tendency to recurrent displacement and that require frequent inspection and antiseptic irrigation of the oral cavity. It is obvious that in fractures involving the angles and rami of the jaw or the condyloid and coronoid processes, or in the graver cases of gunshot and other injuries in which there is great comminution of the jaws with laceration of the soft parts, that total immobilization of the maxilla is necessary and that the splint as a clamp cannot be used. In some of the cases the dental gutter or mouth-piece may be applied with a chin bandage after the reduction of the fracture. This part of the appliance is then used solely as an interdental splint and as an adjunct to the moulded chin-splint used in such cases and held in place with liquid glass, starch, or plaster-of-Paris bandage. The best chin-splint in such cases is a piece of porous blanket or coarse flannel, thoroughly soaked in plaster cream. readily moulded to the contour of the chin and jaw and allowed to dry in situ, any excess of the cloth being trimmed off while the plaster is setting. It is understood that the skin must be thoroughly shaved and lubricated with vaseline before applying the plaster.

If we take, as an example, a typical case in which the jaw is broken obliquely through the body, the first step is to shave the skin and disinfect it in the usual manner. If there are wounds which require suture, they should be closed, preferably with aseptic zinc oxide adhesive plaster strips, which secure the closest coaptation without the risk of stitch abscesses. A general anæsthetic may or may not be required, according to the peculiarities of the case. The mouth should be thoroughly dis-

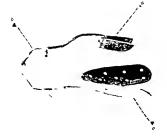


Fig. 3—Author's adjustable metable aphent for fracture of the lower Jaw (listest models) fre-splint corrists of the following detachable parts: (a) a mostly piece of soft metal (block int (b) a disting adjusted and hightened with a screw (c) a chin plate (of perforated alumn num) which can be moved backward or forward by shiding on the lower limb of the clamp This is faxed and held in place by a themb-crew



I'to 4 -- Lateral view of the splint in sala as shown on adult skull



Fig 5 -- Front view.



FIG. 6.—Interior view, showing the adaptation of the hollow dental plate to the contour of the teeth on their lingual aspect. All these illustrations show the clamp-like action by which the splint holds the maxilla, and its mode of action in all fractures of the symphysis and body as far back as the angle of the jaw.



III 7 -- A. S., lower has fractured by falling on a tree while alighting from a car in month. Double compound fracture One into of fracture distingto, the body of the past objects at angle on the right side, the other broke the body of bone between the left latent interest and coming Reduction and permanent appoint on impossible multi the splint was applied. Excellent and functional and pratoment appoint a site was many the splint of the termination of the splint in the splint in the splint in the splint of the splint in the spl



FIG 8—J II compound fracture of lower paw caused by fixt blow. Line of fracture objecting lower paw at angle and termonating above behind last molar tooth. Great displacement and mobility of fragments. Reductions and apposition only obtained by splint Barton bandage used to Immobilitie paws with the splint. Splint worn eighteen days and followed to receive the results.



FIG. 9.—E. B., struck on the jaw with a club; compound fracture. Lower jaw broken completely between left external incisor and canine. Splint worn twenty-eight days without inconvenience and with perfect results.

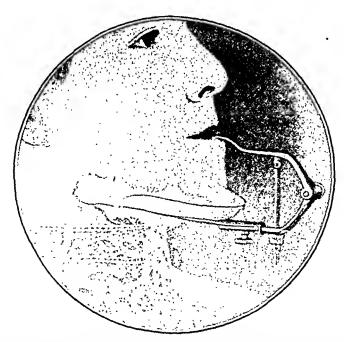


Fig. 10.—Miss N. F., lower jaw broken by fist blow. Oblique simple fracture of body on level with second molar; submucous break, with lateral displacement of left bicuspid and large iragment of alveolus. Perfect result after wearing splint seventeen days,

infected as carefully as possible by copious irrigation with a hot lysol solution (1 per cent). After reducing the fracture, the contour of the dental arch should be restored, and while the bone is held in place by combined external and internal manipulation, one of the metallic dental gutters is selected, according to the age of the patient and size of the jaw, and fitted on the arch of the teeth. Usually the splint requires some moulding with the fingers before a fairly accurate fit can be obtained If the splint fits well, it will usually hold the frag ments in apposition by pressing it firmly against the teeth while making downward and forward traction towards the chin In many cases in which the teeth are loose or missing in places, many cases in which the enter are toose of missing in places, it will be necessary to fill the gutter of the tray with a modelling composition or wax used by dentists in making impressions of the teeth. I have found the 'Excel and S. S. White model ling compounds, sold in all dental depots, especially useful for this purpose, they are quickly softened by dipping in hot water and can be spread very easily over the inner surface of the tray While the modelling compound is still soft in the gutter splint, this is applied to the dental arch and allowed to remain in situ until it becomes hard by cooling. In this way the loose teeth are held in position the gaps between them are filled up and the splint is fixed in place. The outside clamp is now adjusted. Special care must be observed in protecting the skin of the chin, which is frequently contused and hable to inflammatory exdema. This is best done by thoroughly padding the chin plate with cotton wadding and gauze, smoothed over with zinc ointment After the chin plate is adjusted, the clamp is tightened with a screw with sufficient firmness to hold the mouth piece in place. The patient is taught how to irrigate his mouth with a fountain syringe, the irrigations to be thorough and frequent, every hour or two during the day is not too often. In cases in which there is marked contusion of the soft parts and tendency to swell ing it is necessary to relax the tension of the screw at frequent intervals to prevent blistering and pressure necrosis of the skin of the chin. In these cases it is necessary to im

mobilize the jaws during the first few days until the swelling has subsided, using for this purpose a Barton, Gibson, or a sling bandage, which will reinforce the splint and keep it in position while the tension of the clamp is relaxed. After the swelling has subsided, the outside bandages are removed and the splint alone is used, allowing the patient to open his mouth freely for all purposes. Even then, however, it is important that the tension of the clamp be relaxed at various intervals, according to the tolerance of the patient. So necessary it is to protect the skin of the chin from the effects of undue pressure.*

CLINICAL REPORTS OF CASES TO ILLUSTRATE THE USE OF AUTHOR'S SPLINT.†

Case I.—Double Compound Fracture; One through the Left Body, the Other through the Right Angle of the Lower Jaw.—A. S., a German lad, aged eighteen years. On December 19, 1903, while under the influence of whiskey, he attempted to alight from a moving street-car and ward struck full in the face by a small tree. An ambulance was at a ice called for and he was carried to the hospital, reaching there about 6 p.m. He was unconscious when first seen by the ambulance surgeons, but soon recovered. His whole face was horribly contused, looking like a mass of jelly, but the only bone injury was a double compound fracture of the lower maxilla; one being an oblique fracture through the angle on the right, the other through the body, between the lateral incisor and the canine tooth on the left. There was no great deformity at the interdental fracture, the right

^{*}In closing this paper, I desire to thank my assistants and friends, Dr. H. H. Rightor (now of Helena, Ark.), to whom I am especially indebted for valuable suggestions and diligent observations in the first five cases in which the splint was used. To Dr. U. Maes for valuable assistance in making the last model; and to Mr. W. E. Sistrunk, resident interne, Charity Hospital, for clinical observations and statistical data. Also to the McDermott Surgical Instrument Company of this city, who now manufacture the splint and supply it to the trade, for their valuable co-operation.

[†]The first four observations are abstracted from the original histories written by Dr. H. H. Rightor (Tulane Class, 1904), who embodied them in his graduation thesis, entitled, "A New Splint for Fracture of the Lower Jaw, with Reports of Cases."

fragment being slightly anterior to the left, at the angle, however, the anterior fragment was displaced under the posterior for one half mch A cardboard chun piece was moulded to the jaw and Barton's bandage was applied over it. This in nowise approximated the ends of the bone and seemed to increase the pain He suffered intensely all night, requiring morphine hypodermically The following morning the bandages were removed and the mouth thoroughly irrigated. The splint designed by Dr Matas was applied. After reducing the fracture it held the bones in perfect apposition. Though the angular fracture was behind the line of the teeth, the patient was able to use his laws without discomfort. Nevertheless, since his two upper central incisors were missing and there would be no difficulty in feeding him, it was deemed more prudent to apply a bandage in order to immobilize the laws. In attempting to nourish him by means of a rubber tube with a funnel attached it was found that the upper bar of the clamp pressed on the lower lip, preventing the perfect closure of the mouth, thereby rendering sucking impossible and allowing dribbling of saliva Another splint was made with an upward curve over the lower lip, which permitted the mouth to close perfectly (Fig 7) The after treatment was simmount to close perfectly (Fig 7) The after treatment was sim-plicity itself. The patient irrigated his own mouth every two hours with a gallon of o 5 per cent lysol solution, keeping it sweet and clean. The diet was limited to liquids for a few days, and then, when the outside bandage was removed, a more liberal diet ary was allowed. Every fourth day the clamp was loosened and the chin was wiped with alcohol. His recovery was uneventful. On the twenty first day the splint was taken off and the result found to be perfect. There was no deformity and the teeth articulated well The lower set was somewhat blackened from the long contact with the metal, but a few brushings with a tooth powder was all that was needed to restore the original color and polish

Case II — Single Compound Oblique Fracture involving Angle of the Jaw — J H, muscular white man, aged twenty years On Monday, January 9, 1904 he became intoxicated, and when on his way home got into an altercation with two grown negro men They finally came to blows, and one of them landed square on his left jaw with his bare fist The blow knocked the patient down, he was unconscious for a short time, during which his opponents fied He soon recovered and walked to a

neighboring drug store, suffering no great pain, except when attempting to speak. The deformity was so marked that a diagnosis of fracture of the jaw was made on inspection. The examination showed that the line of the fracture was an oblique one, bisecting the angle of the jaw; the anterior fragment was displaced behind and below the ramus. It was impossible for him to close his mouth; crepitus abnormal mobility, etc., in fact, all the classical signs of fracture were present. Digital examination of the mouth showed that the line of fracture terminated just behind the last molar tooth on the left side. The mucous membrane was torn for over an inch. The assistant house surgeon, who attended him, met with no difficulty in accurately reducing the fracture, but found that it was impossible to maintain reduction by the usual routine method. The last splint devised by Dr. Matas and used on the preceding case was readily introduced, and over this a modified Barton's bandage applied. There was now no tendency to recurrence; the pain was immediately relieved, and he never suffered after. The subsequent treatment was the same as in Case I. This patient had also a missing tooth, and through this space he was nourished and the oral cavity irrigated. The splint was removed on the eighteenth day, and, with the exception of a small amount of callus on the

outer surface of the bone, no trace of injury remained.

CASE III.—Compound Fracture of the Body of the Jaw between Canine and Incisor Teeth.—E. B., white male, aged twenty-three years. On January 13, 1904, while he and a crowd of companions were drinking, he got into a fight with his brother-in-law. According to the patient's story, he had the best of it, his opponent being on the ground and he on top of him. While they were in this position, a brother of the opponent struck the patient full across the right face with a club, "knocking him senseless." He remained unconscious during the night, bleeding from the jaw all the time. The following day he was taken to the station and brought by train to New Orleans, thence to the Charity Hospital, arriving there twenty-six hours after the injury. He was very weak and pale from loss of blood. It was determined that he had a fracture of the lower jaw, compound externally and internally; the line of the fracture being between the left lateral incisor and the canine tooth, extending the whole depth of the jaw. There was a tendency to displacement on motion.

The mouth was thoroughly irrigated, the face shaved, the external wound dressed The splint first used on Case I was applied, as the improved one was still in the mouth of Case II Fortunately, the man had extra long teeth, and the curve on the upper limb of the clamp was not necessary, and he was able to close his lips perfectly (Fig q) No bandages were necessary in this case, excepting a small piece of adhesive plaster to hold the dressings on the external wounds. He was able to open and close his mouth from this on without pain Irrigation was practised, as in the other case. In a few days the mucous mem brane had healed, and he was allowed soft foods Mastication caused no disturbance of the fragments. About the time that the splint should have been permanently removed-the eighteenth day-the interne assigned to the service was taken sick. and, as the patient was lostering around, caring for himself, he was in some way overlooked, and allowed to use the splint twenty eight days. At the end of that time it was removed The union was firm and without appreciable callus There was, however, a pressure ulcer, the size of a twenty five-cent piece under the symphysis due to insufficient padding of the chin piece and neglect of the skin. This healed readily under treat ment

CASE IV -Compound Double Fracture, involving the Body of the Lower Jaw, between the Centre and Lateral Incisor and through the Body obliquely into the Angle on the Same Side, complicated with Fracture of the Right Upper Jaw opening into the Antrum, also fractured Zygoma and Contusion of the Brain -No history could be obtained of this case, except that the nationt, who was a colored man, aged twenty three years, had been the victim of a railroad accident He was admitted on March 12, 1904, four days after the injury When admitted he was delirious and in a profound septic condition. The features were unrecogmzable on account of the great swelling, and the mouth emitted a horribly foul and unbearable odor After recognizing the fractures of the raw (lower), the splint used in Case II was applied, and held the ends of the bones in perfect apposition As there was no tendency for displacement, no bandages were applied Copious irrigations were practised hourly to disinfect the mouth, which could be opened with comparative ease, on account of the fixation obtained by the splint. In this way the

local condition of the mouth was very much improved. The patient died on the fourth day after admission from the effects of the contusion and sepsis. The autopsy confirmed the clinical diagnosis. This case is quoted simply to show that the fractured jaw was well controlled by the splint and permitted free and copious irrigation of the mouth while the fragments were held in apposition.

CASE V .- Alveolar Fracture involving the Bicuspid Teeth on the Left; complete Fracture through the Body obliquely to the Angle on the Right.—Miss N. F., aged twenty years, on June 28, 1904, was assaulted by an unknown negro who struck her a terrific blow on the face with his fist. She was stunned without becoming wholly unconscious. She was taken to the hospital in a cab, where an attempt was made to fit on one of the splints used by Dr. Matas. This was one of the early models, consisting of a single mouth-piece, which was permanently attached to the clamp. This was found too long to fit, and a simple bandage, with a chin-splint, was substituted for it. On the second day after the injury she applied directly to Dr. Matas for treatment at his private office, where a model of the splint similar to the one used in the hospital was adjusted to her dental arch, but not until the interdental piece or gutter had been shortened. After this alteration the splint fitted perfectly, and the fragments were held in perfect apposition. (Fig. 10.) She was taught how to irrigate her mouth, and wore the splint constantly without any other bandage or restriction to the movements of the jaw. was removed seventeen days after it had been applied, when it was found that the union was sufficiently firm to dispense with the appliance. There was no deformity or appreciable irregularity in the line of the teeth. The splint was removed every day for a week, and then every second day, to change the padding under the chin and to wash the skin with alcohol. The ease with which this patient could speak, eat, and drink with the splint on was remarkable.

CASE VI.—(Reported by Mr. Sistrunk, interne, Charity Hospital.)—R. A. T., male, aged twenty-five years. May 22, 1904, while boxing with a friend (both using boxing-gloves), was struck on the right side of the lower jaw. He suffered excruciating pains and could scarcely talk. He came at once to the hospital, where he was found to have a compound transverse

fracture of the right half of the lower jaw, midway between the symbhysis and the angle. The teeth upon the side nearest the angle of the law were raised above the others, and the broken ends of the bone could be seen protruding through the lacerated wound in the gum. After reducing the fracture, the splint devised by Dr Matas was applied and held the fragments in perfect apposition The splint gave him almost instant relief, and after its application the patient could easily talk and swallow without much pain. He returned the next day, and the splint was removed and the mouth irrigated with a I per cent solution of carbolic acid The removal of the splint was followed by considerable pain, and the patient begged to have the splint replaced. This was repeated every day for ten successive days, when it was found that the bones remained in position without the splint By this time an ulcer had developed under the tongue, which was attributed to pressure. In consequence of this ulcer and the fact that the bones had united sufficiently to prevent displacement, the splint was removed. The patient was discharged on June 3, at his own request, with a Barton bandage put on to hold the dressings under the chin and as a protection against

displacement of the fracture. When he was discharged, no motion or crepitus could be obtained and the teeth were on a level

SOME CONSIDERATIONS REGARDING WOUNDS OF THE LIVER.1

BY BENJAMIN T. TILTON, M.D.,

OF NEW YORK,

Surgeon to Lincoln Hospital; Assistant Surgeon to Bellevue Hospital.

MUCH attention of late years has been devoted to the general consideration of open and subcutaneous injuries of the abdominal viscera, and at the present time the diagnosis, indications for operation, and the operative treatment itself of these injuries are questions that have been fairly well solved, and with regard to which reasonably definite conclusions have been reached.

The determination of the existence of some visceral injury has now become possible in most cases by our present methods of examining the abdomen and noting the changes here as well as the alterations in temperature and pulse. The rule to operate for these injuries within the abdomen has become so definite that we are often inclined to make merely the general diagnosis of a wounded viscus, and then proceed at once to laparotomy without a more definite determination of the particular structure involved. It is the object of this paper to consider the injuries of one particular organ, the liver, and to discuss their special signs, prognosis, and indications for treatment.

Etiology.—The liver is injured with greater frequency than any other solid abdominal viscus. Among 365 cases of subcutaneous injuries of solid viscera, the liver was the seat of injury in 189, and the spleen, kidney, and pancreas combined in 176. There are several factors which make it particularly susceptible to injury, especially in contusions of the abdomen. It lies wedged in between the ribs and vertebral column, is very heavy, very inelastic, and only slightly movable. It is nine times as heavy as the spleen and ten times as heavy as the

¹ Read before the New York Surgical Society, November 9, 1904.

kidney Other predisposing factors are added from physiological and pathological causes Digestion makes it larger and more vascular Alcoholism, tuberculosis, malarial conditions, and tumor formation render it more friable and exposed to injury. In the presence of any one of these conditions a very slight traumatism may suffice to produce a subcutaneous rupture of the organ with fatal outcome. Chair reports a case of rupture of a carcinomatous liver simply from turning over in bed. Heinzelman that of the sudden death of a patient from rupture of the liver who two weeks before had had pneumonia followed by pleurisy. In the following case, which recently came under my own observation, the etiology of the injury to the liver was very obscure.

Case I —A man, twenty-seven years of age, was admitted to the prison ward at Bellevine Hospital, September 20 of this year, suffering from what was thought to be alcoholic delirium. A history was later obtained from his family that he had been ill for three weeks. There was no history or mark of traumatism On admission his temperature was 1002° F, pulse, 120, and respirations, 26 The leucocyte count was 15,000 He was markedly alcoholic in appearance and very delirious. The abdomen was somewhat distended, and there were well-marked rigidity and tenderness on the right side over and below the ribs. The liver extended from the sixth rib above to three inches below the free border. The spleen was not enlarged. A diagnosis was made of probable abvects of the liver.

While operative interference offered but little hope of a favorable outcome on account of the poor condition of the patient, it was decided upon as the only chance for his recovery. An in cision was made through the right rectus, exposing a very large, congested, and friable liver. There was an escape of some thut bloody fluid from the peritoneal cavity, but there was no pertonuts. On inspecting the convex surface of the liver, which was somewhat adherent, a large tear was discovered on the right lobe about six inches in length. The edges for a distance of three inches on either side were necrotic, and loose sloughs of liver tissue could be removed with the fingers. The injured portion of the liver was about to break down and form a superficial

abscess. Some of the necrotic tissue was removed, the resulting defect packed with gauze, and the abdomen partially closed. The patient's condition did not improve, the delirium continued, and he died on the third day with a temperature of 103° F.

This seems to have been a case of subcutaneous rupture of the liver in a very alcoholic subject without any history of injury. Some injury undoubtedly occurred, but it was apparently not severe enough to produce signs over the liver region or lesions of other parts of the body. Traumatism was never thought of in making the diagnosis before operation.

The two varieties of wounds of the liver, viz., the subcutaneous and the open, are, according to Edler's statistics, about evenly divided. Of the open injuries, gunshot wounds were nearly twice as common as stab wounds. These figures will, of course, vary in different countries and localities. The ribs, however, offer more protection from stab wounds than from those produced by a bullet. Subcutaneous injuries are very common in children, especially in the large cities, where they are exposed to run-over accidents and falls from high tenement houses, fire-escapes, etc.

As far as the portion of the liver involved is concerned, we find that in subcutaneous injuries the right lobe is injured about six times as frequently as the left, and the convex surface about twice as often as the concave. In stab wounds, on the other hand, the left lobe is the more frequently injured, owing to the fact that it is less protected by the ribs than the right.

Wounds of the liver are very frequently associated with injuries of other organs. Probably no organ has as many complicating injuries. In subcutaneous rupture very common associated injuries are those of the lung, spleen, kidney, gastro-intestinal tract, and bile ducts. Injuries of distant parts, such as fractures of the skull, spine, and extremities, often accompany ruptures of the liver. In this case the latter are frequently due to violence by contra-coup. Thus, a man falling from a height upon the head or feet fractures the skull or extremities, and the liver by indirect violence is torn from its attachments or forcibly pressed against the contracted dia-

phragm Among 151 cases of subcutaneous rupture collected by Hinzelman, one third were produced by indirect violence.

Gunshot wounds and stab wounds are found associated many times with perforation of the diaphragm, lung, stomach, or meetines, and ludney The presence of these complicating injuries increases very materially the gravity of the prognosis and renders our operative interference much less hopeful

The following case of gunshot wound of the liver had a rather unusual feature

CASE II -A man, twenty-five years of age, was admitted to Bellevue Hospital in August, 1900, with a history of having been shot in the abdomen by a pistol of 32 caliber The wound of entrance was to the right of the median line near the free border of the ribs There was no exit opening There was some shock, but no signs of internal hæmorrhage Laparotomy showed two openings in the liver, one on the convexity, the other on the under surface These wounds had caused only slight hæmorrhage No other wounds were found, although the intestines and stomach were carefully examined. The wounds in the liver were covered by strips of gauze, which were brought out through the abdominal incision During the convalescence the dressings were stained with bile for several days Six weeks after the injury the patient complained of pain about the rectum, and examination showed a small ischiorectal abscess. This was incised, and inside of it was the 32 caliber bullet. In all probability, the bullet entered the intestine either at the time or by ulceration, and then remained in the rectum, where it ulcerated through the mucous membrane, causing the abscess Otherwise the recovery was uneventful

Symptoms—In determining the existence of a wound of the liver, we have usually a number of factors of more or less diagnostic aid. In subcutaneous wounds there may be signs of local injury of the overlying parts. Ecchymosis of the skin or fractures of ribs may turn our attention towards the liver as the injured organ. In gunshot wounds there will be a wound of entrance usually over the liver, and if there is a

wound of exit, the direction taken by the bullet may determine whether the liver has been perforated. Escape of venous blood with or without an admixture of bile are important positive signs, particularly in stab wounds. Localized pain over the liver which is intensified by pressure or percussion is usually present. Pain radiating to the right shoulder is suggestive of injury of the liver, and has been noted in a number of cases. The pain in the liver region is intensified by respiration, and hence the right chest does not move as freely as the left. In consequence, a false diagnosis may be made of intrathoracic injury. Terrier reports such a case in which a thoracotomy was done, and the autopsy showed the injury to be a rupture of the liver, with a large accumulation of blood in the abdomen.

Hæmorrhage being an important and constant accompaniment of wounds of the liver, symptoms of the same, both local and general, are usually present. In severe injuries, especially subcutaneous ruptures, the general signs of hæmorrhage are well marked, but are not always easy to differentiate from the symptoms of severe shock that accompany these injuries. The accumulation of blood in the abdomen can frequently be demonstrated by percussion. Rigidity of the abdominal muscles may, however, render this a difficult task. The blood gravitates into the right iliac fossa and may give well-marked dul-The diffusion of blood causes, furthermore, gradually increasing pain from pressure, and this is often a characteristic sign of rupture of a vascular organ. Disappearance of liverdulness due to beginning tympanites may come on in a few hours, and should not lead to a false diagnosis of a ruptured hollow viscus. When due to escape of gas from a ruptured intestine, this disappearance of the liver-dulness comes on immediately after the injury. Later on the area of liver-dulness is increased from a resulting hepatitis.

Jaundice is occasionally present after injuries of the liver, but usually does not appear until the second to the fourth day. It is caused by absorption of bile from the peritoneum. Ludwig found it twenty-four times in 267 cases. It is very frequent after injuries of the bile passages. In case of subsequent

inflammation or abscess formation in the liver, a secondary jaundice may occur days or weeks afterwards

The escape of blood and bile into the peritoneal cavity may result either in an acute septic peritonitis or a chronic plas tie peritonitis with adhesions. The blood coming from the portial circulation varies in its infectious character. This depends somewhat upon the condition of the gastro-intestinal tract at the time of injury. The same is true of the bile, that from the common duct is more dangerous than that from the liver itself. The onset of this acute peritonitis may be very gradual. Open injuries may, of course, cause direct infection from the outside or by means of a foreign body.

The signs which accompany any visceral injury are usually well marked in case of injuries of the liver. The rigidity of the abdominal muscles is a never-failing symptom. It may be confined to the region over the liver. Vomiting and hiccough are not uncommon, and are due to the peritoneal irritation. A rise of temperature usually takes place from absorption of blood from the peritoneum. The rise of temperature due to peritonitis occurs at a later period, usually the second to the third day.

Prognosis—The prognosis of injuries of the liver depends largely upon the associated injuries and the complications. The severest cases die within twenty four hours from shock or liremorthage. These cases are hopeless from the start, and there are frequently injuries of other organs. The promptest operative interference will not be able to lessen the mortality of these severe cases. Of 162 fatal cases collected by Edler, hæmorrhage was the direct cause of death in sixtynine. Generally speaking, the prognosis of injuries of the liver alone is much better in the gunshot and stab wounds than in the subcutaneous ruptures. The hæmorrhage in the former is less severe and the shock less marked. Apart from hæmorrhage and shock, the complications due to infection in fluence the prognosis very materially. Acute peritonitis and abscess of the liver are responsible for many deaths. Even in subcutaneous injuries, accidental infectiousness of the bile.

or of the blood from the portal system may cause suppurative peritonitis. Furthermore, the contused wound of the liver may offer a favorable location for the development of an abscess, particularly if the blood circulating in the liver is infected or the resistance of the tissues is much lowered. A long period may elapse before the fatal outcome. Even a plastic peritonitis may cause a fatal result from obstruction of the intestine by adhesions.

There are many mild cases of laceration of the liver which go on to recovery without complications and with very few symptoms. The number of these cases is, I think, larger than is generally supposed. They often go unrecognized, and the person recovers with a diagnosis of severe contusion of the abdomen without visceral injury. The present tendency to make an exploratory laparotomy in severe contusions of the abdomen which show signs of muscular rigidity and which are suspected of being complicated by a visceral rupture occasionally brings to view a mild laceration of the liver, especially of the convex surface, with very moderate hæmorrhage. Such cases have an excellent prognosis, and recovery will usually result whether they are operated upon or not. If these mild cases in which there are one or more superficial ruptures were included in the statistics, the mortality percentage would be a great deal lower than it is at present.

In 1887, Edler's statistics showed a mortality in subcutaneous ruptures of 78.1 per cent.; gunshot wounds, 39.0 per cent.; stab wounds, 37.5 per cent. This mortality, particularly of subcutaneous injuries (78.1 per cent.), seems much higher than at the present time, and this, if true, is probably due to earlier recognition and earlier operation. The recent statistics of Terrier and Auvray covering forty-five cases, all of which were operated upon, represent much improved mortality statistics. Among eleven cases of rupture five died, a mortality of 45.5 per cent. Among fourteen gunshot wounds four died, a mortality of 28.3 per cent., and among twenty stab wounds five died, a mortality of 25 per cent. The mortality of all the cases was 30 per cent. against the total mortality in Edler's

statistics of 66 per cent Like all statistics of operative cases, these of Terrier and Auvray may be objected to on the ground that the successful ones are more likely to be published than the unsuccessful They show, however, that with early diagnosis and prompt operative treatment much can be accomplished in lowering the very high mortality which the severer forms of wounds of the liver have had in the past By collecting cases from hospital records and not from published sources, a more accurate idea can be obtained of the mortality of these injuries under present methods of treatment I have made such a collection, excluding cases that were complicated by serious lesions of other abdominal organs or of other parts of the body which were clearly responsible in great measure for death. These cases occurred within the last ten years in New York hospitals with large accident services They are twenty five in number, and are divided as follows ruptures, 12, gunshot wounds, 9, and stab wounds, 4 Death occurred in eleven cases, a mortality of 44 per cent The cases which were treated by early tanny of 44 per cent. The cases which were freated by early laparotomy were twenty in number, with a mortality of 40 per cent. The mortality among ruptures that were operated upon was 62 5 per cent, stab wounds, 33 per cent, and gunshot wounds, 28 5 per cent. These statistics are not quite so favor able as those of Terrier, but probably represent more accurately the actual mortality

Treatment—As far as the treatment of injuries of the liver is concerned, the modern tendency is towards early laparotomy, as in suspected injuries of any of the abdominal viscera. Open wounds should, without exception, be treated by enlargement of the wound, exposure of the liver, and determination of the site and extent of the injury to the organ. In this way can we alone be sure of excluding or finding associated injuries, removing foreign bodies, stopping hæmorrhage, preventing secondary hæmorrhage, and avoiding infection of the liver or of the peritoneal cavity. Care should be taken to examine the entire liver, as a second wound may remain unnoticed and give rise to fatal bleeding. Many cases of guishot or stab wounds will doubtless recover by expectant

treatment, but other cases will die from some of the above accidents, which could have been discovered or avoided by enlarging the wound. The latter procedure adds littls to the risk if done under favorable conditions, and if more generally employed will result in still better statistics. Some authors still recommend expectant treatment in these cases in the absence of urgent symptoms, such as hæmorrhage, on the ground that these milder wounds not infrequently result favorably without operation. This seems a wrong principle to work on. Many cases might recover without interference, but others will prove fatal from oversight of an intestinal perforation or foreign body, or from insufficient drainage of the wound in the liver.

The indications for operation in subcutaneous injuries are not so definite. In the absence of distinct signs of hæmorrhage, of marked rigidity of the abdominal muscles, of dulness in the right iliac fossa, and of increasing abdominal pain, an expectant attitude seems justified, even though the nature of the injury and the presence of shock point to some degree of laceration of the liver. The fact that these slight ruptures heal without incident has been abundantly proved by exploratory laparotomies where they have been found, the abdomen closed without further interference, and the patient gone on to prompt recovery. The lesions of the liver are circumscribed and not deep, the amount of hæmorrhage is slight, no bile-ducts are torn, and the risk of peritonitis is at a minimum. Under these conditions, the unnecessary exposure of the liver adds considerably to the risk; what was a mild subcutaneous injury is converted into an open one with all its possible consequences. very young and weakly subjects the added shock of an exploratory laparotomy may turn the scale against the patient.

Matters are very different in the severer cases with well-marked and progressive symptoms of internal hæmorrhage, peritoneal irritation from accumulating blood, dulness in the iliac fossa, and that very important and never-failing rigidity of the abdominal muscles associated with a severe visceral rupture. Here the surgeon has no choice, and he must operate to

stop hæmorrhage Furthermore, it is imperative to examine for the associated injuries of other viscera which so frequently accompany severe ruptures of the liver. In order to expose satisfactorily wounds of the convexity of the liver, it may be necessary to divide the lower ribs or cut the suspensory ligament.

The best methods of stopping hæmorrhage are by the use of sutures or gauze packing If the former are used, they should include considerable liver tissue at the edges of the wound, and if possible go down to its full depth Blunt needles as recommended by Mikulicz and Kader seem well adapted for suturing Gauze packing is particularly suitable for contused wounds, gunshot wounds, and punctured wounds, and is, furthermore, a useful addition to suture. The thermocautery is of very little value in arresting hæmorrhage from the liver The blood and bile can easily be removed by flushing the abdomen with hot saline or by dry sponging, according to the preference of the operator Drainage is employed in subcitaneous wounds chiefly for the purpose of arresting hæmorrhage. In gunshot and stab wounds with a dirty instrument, it is a valuable means of preventing local infection of the organ or general infection of the peritoneal cavity

The following conclusions seem to be justifiable. The prognosis of the severer cases of wounds of the liver alone has improved of late years, especially under early operative treat ment. Many cases must necessarily, of course, be promptly fatal from shock or hæmorrliage or from associated injuries of other organs. Many others can be saved by operation which would otherwise die from hæmorrhage or some complication. The treatment of all open injuries should be early laparotomy for the purpose of hæmostasis, thorough examination, and prevention of infection. As regards subcutaneous ruptures, the mild cases without marked symptoms of collapse or internal hæmorrhage should be treated expectantly. Cases in which there are marked collapse or signs, local or general, of internal hæmorrhage should be treated by early laparotomy, with suture or packing of the wounded liver. The mortality of

wounds of the liver alone will in all probability diminish from year to year with the more general adoption of early laparotomy.

LITERATURE.

Brehm. Archiv f. klin. Chirurgie, Berlin, 1904, Ixxiii.

Edler. Archiv f. klin. Chirurgie, xxxiv, 1887.

Fraenkel. Subcutane Leber-ruptur, Beiträge z. klin. Chirurgie, Band xxx, 2.

König. Berlin. klin. Wochenschrift, 1900, No. 4.

Roeser. Beiträge z. klin. Chirurgie, Band xxxvi, 1902.

Schlatter. Beiträge z. klin. Chirurgie, Band xv, p. 531.

Terrier and Auvray. Revue de Chirurgie, 1896, No. 10.

CONGENITAL ELONGATION OF THE LEFT LOBE OF THE LIVER

BY LEVI JAY HAMMOND, MD,

OF PHILADELPHIA.

Congenital deformities of the liver confined to the left lobe, sufficiently extensive to cause symptoms, must be instructive, since careful search of the literature discloses the record of but one case that in any way could be regarded as analogous (Langenbuch, in Deutsche Chirurgie, 1897, Lie ferung 45, Leber u Gallenblase, 112) This case is described as short corset liver where, in addition to the right lobe being pressed upward into the diaphragmatic space, the left lobe is pushed across in the left hypochondrium, where it developed so strongly as to spread over the entire fundus of the stomach, and even over the spleen. In this instance the right kidney was also pressed downward.

Symptoms in this case were pressure, pulling, and pain in the epigastrium. It was a woman thirty years of age, who had known of its existence for eight years. During this time she had suffered with abdominal pain when either standing or lying down, but especially in the latter position. When lying on the side or abdomen she had little or no pain, while on the back it was greatly increased. There were, in addition, palpitation of the heart, flushes to the head, a feeling of oppression, and constant gastric disturbance, there was also aching in the legs.

Langenbuch further remarks that the left lobe of the liver is rarely affected alone, though it is at times in conjunction with the right lobe Enlargement of the right side of the liver rarely, if ever, could give this chain of symptoms, because of the difference in the organs pressed upon

Treatment in his case consisted of incision and resection of the left lobe, secondary hæmorrhage following, which was

controlled by ligation of the vessels. Ascites existed for a short time after operation. Other authors refer to enlargement of the left lobe, but always in conjunction with the right, and most of them cite this one of Langenbuch's alone as an instance of left lobe enlargement.

J. E. Graham (in "Diseases of the Liver," Loomis—Thomas, "American System of Practical Medicine," 1898, p. 411) states that congenital changes in the form of an enlargement of the left lobe are greater than may occur in the right.

Murchison (in "Diseases of the Liver," 1868, p. 9) says that the left lobe has been found in the fœtus larger than the right.

J. H. Waring ("Diseases of the Liver," 1897, p. 59) says that among liver anomalies the left may be long and thin, having been met with extending downward and to the left into the left hypochondrium, or even to the left lumbar region as far as the spleen, or even below this viscus. (His reference is to the case of Langenbuch to which I have previously referred.) When this form of lobulation occurs, it may be mistaken for large spleen, but is usually definable connected with the liver, and its very free movement during respiration would indicate the nature of the enlargement or swelling to be in the left hypochondrium.

The subject of this report is a girl sixteen years of age. She consulted me in June, 1893, for a painless tumorous distention of the epigastrium, which she had noticed for nine years, though she had been suffering from spells of distressing discomfort at times for only about two years.

History.—She had never been ill except when five years of age, then with measles; she was exceptionally well developed, indeed, presented all the evidences of a perfect physique, height being five feet, one inch, weight 130 pounds. She had never had jaundice, colicky pain, chills, nor fever. Her occupation as laundress for the last two years had seemed to increase the feeling of distress after eating. This feeling of distention and pressure in the epigastrium, palpitation of the heart, and dyspnæa had been prominent symptoms from which she had suffered from her

earliest recollection She was entirely free from all of these symptoms, when in the upright position, when hungry, that is, when the stomach was empty The symptoms were not complained of when she was lying partly upon her abdomen, though they were always present even when the stomach was empty, when lying upon her back

On her first visit, which was shortly after having taken breakfast, the symptoms complained of were prominently brought out when she was placed in the recumbent position on the examining chair. Examination at this time showed what seemed to be an immensely distended stomach, there was very pronounced tympany above and below a dull area, which extended entirely across the epigastrium, being lost beneath the costal cartilages on either side. The fat belly walls made it somewhat difficult to determine whether or not the mass was influenced by respiration, but it seemed to be. With considerable pressure the edge of the right lobe of the liver could be felt just below the costal margin, dyspinea seemed, as far as one could determine, due to the diaphragm being pushed up, the apex beat of the heart being heard most pronounced in the fourth interspace. The tumor was painless, the only complaint made was that percussion increased dyspinea and caused nauses.

The condition had been variously diagnosed as gastrooptosis distention of the hepatic flexure of the colon, hydatid or echinococcus cyst, or sarcoma of the liver My own feeling was that it was in all probability a cystic condition, probably of the pancreas The question of syphilis of the liver was hardly to be entertained Temperature was normal, pulse in the sitting posture 78, while in the recumbent 120

I examined the patient the following day, six hours after she had taken food, at which time there was a notable absence of tympany, no dyspinca, but some distress in breathing when in the recumbent position. The apex beat of the heart was now most pronounced in the fifth interspace. The dulness extending over the tumor was unchanged. Urine analysis was negative, special attention was given to a search for bile pigment, none was present, blood showed normal count. Exploratory incision was the treatment advised.

Operation —Under ether anæsthesia, the stomach was exposed through a median incision five inches long. The stomach

was found pushed down so that the greater curvature was on a level with the umbilicus. The left lobe of the liver extended entirely across the lesser curvature into the left hypochondrium, where it was flattened out at the extremity over the spleen. There were no adhesions present anywhere throughout its extent. It could be lifted from its position with no difficulty; it was exceptionally thin, and the capsule was apparently normal, if anything slightly thickened over the anterior surface where it came in contact with the abdominal parietes. No nodules were present, nor any other evidence of pathologic change. The right lobe was apparently normal; the right kidney was in normal position; the spleen was normal, except an indentation over its surface caused by pressure from the liver resting upon it. The pancreas was entirely normal.

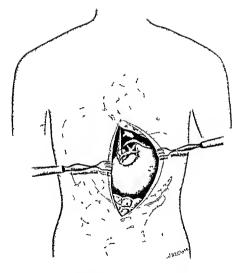
An effort was made to see how much of this elongated lobe could be replaced into normal position, but it was impossible to return any of it, because of the embarrassment to respiration that occurred when the slightest effort at returning the lobe was exerted. The entire lobe was then held up against the abdominal wall by an assistant while it was sutured. There was no bleeding of any note. The abdominal wall was then closed, and the girl's recovery was uninterrupted.

The results have been perfect; there has been entire disappearance of all digestive disturbance, and the girl regards herself as entirely well.

The tumorous convexity can still be seen, and the dulness is present as before operation; tympany, displacement of the heart, dyspnœa, nausea, and distress caused by position have entirely disappeared.

(The photograph and colored plate show the tumorous distention and the exact relation of the tongue-like elongation of the organ at the time of operation. The length of the lobe from the free margin of the liver to its apex was six and one-quarter inches; width, one and three-quarters inches.)

Ventrosuspension, in this particular case at least, seems to have been the proper line of treatment to carry out; and, indeed, in all cases where there is no malignant change, it would seem less dangerous and quite as liable to effect a permanently



Dog to gued elongat on of the left lobe of the ler Co gen al)

		,	
			•
	•		
	•		
•			
		· -	
		•	
	`		
37	977		

satisfactory result as resection, as has been shown by both Pon fick and Von Meister that resection of a part of the liver will be followed by a regeneration, consequently nothing would be gained by resorting to resection (Lancet, 1890, 1, 1891, 11, p 1409) While the history clearly shows that a marked deformty had existed from early childhood, there is no doubt but that there had been a process of gradual extension of this

congenital tongue from the main body of the organ during the last two years, due to the patient's occupation, which caused a sufficient amount of trauma to encourage growth. There is no doubt but that this is a true case of congenital elongation of the left lobe of the liver, and not in any way belonging in the category of the so called lacing liver. This type is found more often in an adult female (Langenbuch's case being more espe cially of this type), and in the larger percentage of cases in volves the right lobe alone, or, when the left is involved, the deformity is always associated with right sided enlargement. It is further shown by numerous autopsies that when the left

lobe is deformed it is usually folded upon itself and more or

less incurved

THE SURGICAL TREATMENT OF CHRONIC DYS-PEPSIA DUE TO DEFECTIVE DRAINAGE, AND CHRONIC INFLAMMATION OF THE STOMACH RESULTING FROM GASTRIC ATONY AND DILATATION.

BY JOHN G. SHELDON, M.D.,

OF TELLURIDE, COLORADO.

A not infrequent cause of disagreeable and long-standing dyspeptic symptoms is gastric atony followed by chronic gastritis, moderate dilatation, and defective drainage of the stomach. These conditions, when of long standing, give rise to almost continuous dyspeptic symptoms associated with secondary neurasthenia, of more or less severity, and chronic constipation. Gastro-enterostomy, with closure of the pylorus, will give these patients complete and permanent relief, not only from the stomach symptoms, but also from the neurasthenia and constipation.

I do not accept the foregoing statements as conclusive; neither am I able to present proof that will be convincing to all; but I do believe that, if we bear these statements in mind, we shall occasionally find a chronic sufferer whose condition corresponds to them, and who can be completely and permanently relieved only by surgical interference.

It is generally admitted that fatigue of the gastric muscle, followed by gastric atony, elongation of the gastric muscle fibres, and consequently enlargement of the stomach cavity, does occur. Turck,¹ Kemp,² Rose, and others have discussed the occurrence of the loss of tone of the gastric muscle in detail. When the condition is only of temporary duration, its importance is overlooked; and in these cases, special attention has been given to the secretory derangements of the organ as a cause of the symptoms. When the muscle tonus of the stom-

37

ach is lost for a considerable period of time, chemical treatment does not releve the symptoms. This fact has led observers to study disturbances of the motor functions of the stomach and to pay less attention to secretory derangements and chemical treatment. Mayo 2 says that "it is the mechanics of the stomach that is usually at fault and not its chemics, and it is for this reason that surgery is rapidly invading the field." Of course, secretory disturbances of the stomach occur, associated with motor disorders, and independently of them, but they are doubtless of secondary importance in producing symptoms. In fact, Einhorn has shown that even achylia gastrica can occur, and produce no symptoms if the motor function of the stomach is not impaired.

If we attribute the symptoms of some cases of chronic dyspepsia to primary muscular atony and insufficiency, the succession of changes in these long standing cases would seem to me to be the following:

The continuous atony of the stomach musculature results in incomplete emptying or deficient dramage, of the organ, either from a resulting pouch formation, or from lack of mus cular force to expel the stomach contents. The material that remains in the stomach undergoes chemical changes resulting in the formation of products that have a local effect on the mucosa of the stomach, and are absorbed and are capable of producing more or less marked general changes The local changes produced in the stomach are very likely to cause a chronic inflammation of the mucosa, which, of course, would be responsible for the symptoms of a chronic gastratis The general changes, due to absorption of chemicals from the stomach, may vary greatly in their effects and intensity Sec ondary anæmia, which, as Hunter has suggested, may advance to permicious anæmia, might occur Of other possible conditions that might result from absorption of toxic stomach contents, I shall mention only those due to involvement of the nervous system

We have for some time recognized severe cases of tetany due to stomach to armia Examples are recorded by Cunning-

ham,4 Robson,5 Fleiner,6 Carnegie,7 Albu, and others. I have no doubt that nervous symptoms, less severe than tetany, can and do occur as a result of defective gastric drainage. I am of the opinion that the neurasthenia, so commonly associated with chronic dyspepsia, is not primarily dependent on some change in the nervous system, but is the result of the action of toxic products absorbed from the stomach. The theory that the nervous symptoms are primary, and that the dyspepsia is secondary and dependent on a primary nervous disease, is improbable. We must admit, however, that lesions in the nervous system are capable of producing stomach symptoms and definite gastric changes. Carion and Hallion 8 found that section of the vagus nerve is sufficient to produce complete atony and permanent dilatation of the stomach of the dog. Pawlow and Katschkowsy 9 have shown that cutting even both vagi nerves produces only a temporary disturbance of gastric movements. These and many other experiments, though not without value, are by no means convincing. Regarding them, Ewald 10 says, "Yet all these experimental stimulations in mammals have an indefinite and uncertain character; their success is not great, and by no means constant."

On the other hand, we have examples of tetany being relieved by drainage of the stomach; and we also have examples of the disappearance of nervous symptoms following drainage of the stomach for obstructions of the pylorus. I think we can safely say that it is probable that many times a neurasthenia is present as the result of absorption of toxic products from a stomach that does not drain properly.

Another symptom that is usually complained of by the patients suffering from gastric atony, inflammation, and defective drainage, is chronic constipation. The cause of the constipation might be due to the small amount of solid material that these patients usually pass into their intestines. Lohrisch ¹¹ says that the absence of a sufficient quantity of dry residue in the intestines inhibits the growth of the intestinal flora and diminishes the production of indol, skatol, etc. The absence of

39

sufficient quantities of these stimulants of the bowel explains the constipation. I believe that the constipation in these cases is not accidental, or due to independent causes, but is the result of the defective drainage of the stomach. It was present in the three cases that I operated upon, and I have seen it present in other conditions that interfered with the drainage of the stomach. Gastro enterostomy usually cures the constipation in these cases. Waterhouse 12 reports thirty-one cases of gastro-enterostomy on patients suffering from defective drainage of the stomach and chronic constipation. In all of these patients no constipation existed after the operation. Murphy and Oclisner 13 have not seen cases of constipation, following properly done gastro-enterostomies, unless produced by some definite local cause.

The recognition of defective drainage of the stomach due to chronic gastric atony and inflammation is made from the symptoms of chronic dyspepsia associated with neurasthenia and chronic constitution, and by excluding other stomach lesions that would produce similar symptoms Obstruction of the pylorus, displacements, ulcer, tumors, and deformities usually present some symptom more or less characteristic of the condi tion present I shall not go into the symptomatology or diag nosis, but shall be content with making a statement regarding the indication for operation in these cases. Any case of severe and long-standing dyspepsia that resists all generally advised methods of treatment, and that shows no permanent improvement after giving the stomach absolute rest for two weeks by rectal feeding, should be submitted to a laparotomy advice may be too radical to accept, but I believe, from the statements of Kemp. Cramer, and others advising operations on the stomach that we shall lose little if we follow it

If we can relieve these cases by gastro enterostomy, as I have done in three instances, and if the good results following gastro enterostomy for beingin conditions prove to be permanent, we are justified in advising operation for all serious cases of chronic dyspepsia that will not yield to less radical treatment.

Case I.—J. B., a miner, forty-eight years old, said that he had suffered from "stomach trouble" for twelve years. He complained at times of more or less pain in the epigastrium, soreness of the stomach, belching of gas, "sour stomach," loss of appetite part of the time, and constipation. He vomited occasionally, but had vomited less during the last three years than previously. His appetite was poor most of the time, although occasionally he would have a desire to eat. His illness, though very distressing, did not prevent his working part of the time.

Examination showed the patient to be anæmic and somewhat wasted, but not markedly emaciated. He was plainly neurasthenic, and had been so for ten years. Physical examination of the internal organs revealed nothing abnormal. The blood showed changes that corresponded to a moderate degree of secondary anæmia. The urine revealed nothing abnormal. Inflation of the stomach with acetic acid and sodium bicarbonate showed that the organ was considerably enlarged. The stomach contents contained free hydrochloric acid twice out of three examinations. Organic acids were found at each examination. The results of examinations by means of the tube and test meals revealed nothing that indicated a definite stenosis of the pylorus.

In the way of therapy, the patient had received only medical treatment. This consisted of the remedies prescribed by various physicians, and many patent medicines and remedies that he had been advised to take by his friends.

I washed out his stomach several times,—usually obtaining a considerable quantity of mucus at each washing,—and placed him on a liquid diet. He improved somewhat, and after six weeks resumed his work. He returned in one month and said that he was no better. After placing him on rectal feeding for two weeks, I did an exploratory laparotomy.

The stomach was much dilated and its walls were very thin. The pylorus was not indurated and did not seem narrowed. The gall-bladder and appendix appeared normal. There was no enlargement in the region of the pancreas. An anterior gastroenterostomy was done with a Murphy button.

The patient recovered without difficulty, and at this time, two years after the operation, is well and strong. He eats the same food as do the other members of his family. He no longer

complains of "stomach trouble or nervousness," and is not constinated

Case II —A merchant, fifty two years of age, had suffered for fourteen years with "stomach trouble," neurasthema, and constipation His gastric symptoms did not differ materially from those of Case I They did not correspond to a definite stenoise of the stomach tube and test meals that the stomach did, or did not, empty itself with readiness At times the ingesta would remain in the stomach for several hours, and again the organ would appear to empty itself in a very short time

He had been a user of the stomach tube for years, and would wash his stomach nearly every day, and sometimes three or four times a day

I treated him in various ways for six months while he watched the progress of Case I, and then operated upon him

The stomach was considerably dilated with thinned walls. The pylorus seemed normal No other abnormal changes were found I did a posterior gastro enterostomy by the suture method.

The result was as gratifying as in Case I The gastric symptoms, neurosthema, and constipation rapidly disappeared At this time, eighteen months after the operation the patient remains well

Case III —A commercial traveller, thirty eight years of age had complained of chronic dyspepsia for seven years. Until three years ago he had been a heavy drinker of beer and whiskey. He had attributed his dyspepsia to the excessive use of alcoholics, and ceased using them three years ago. This gave him little or no relief.

He was typically neurasthemic and chronically constipated

Examination revealed nothing that would point to anything but a chronic gastritis and a somewhat dilated stomach as the cause of his symptoms. As the patient had tried almost every known method of treatment. I advised operation without further delay.

Operation revealed a moderately dilated stomach Its walls were not much thunner than normal The pylorus showed no evidences of being constricted The remainder of the abdominal organs revealed nothing abnormal I did an anterior gastro-

enterostomy with a Murphy button, and practically closed the pylorus in the following manner: I flattened the pylorus and freshened the peritoneum covering its anterior surface by scraping with a knife. I then placed four catgut sutures in such a manner that their tying approximated the superior and inferior borders of the flattened pylorus. These sutures, without penetrating the mucosa, simply folded the pylorus on itself by bringing its superior and inferior borders together. I am quite satisfied that this method will close the pylorus temporarily, but I have no way of knowing the permanency of the closure. I closed the pylorus in this case because some had claimed that a gastroenterostomy with a patent pylorus was apt to be followed by unpleasant symptoms, and perhaps closure of the gastro-enterostomy opening. I did not attempt to close the pylorus in the previous two cases; but in these the stomach walls seemed very atrophic, and it was improbable that the stomach regained much muscular power even after being perfectly drained.

The patient made a complete recovery, and at this time, five months after being operated upon, is in good health. His stomach no longer gives him trouble, and his "nervousness" and constipation have disappeared.

I have purposely omitted a discussion, in detail, of the symptoms, physical and chemical findings, and diagnosis in these cases. The diagnosis is made by exclusion, and, in my experience, has not always been correct. In one case in which I expected to find only a dilated and atonic and chronically inflamed stomach, I discovered a beginning carcinoma of the pylorus. I did a pylorectomy. This was eighteen months ago, and the patient still remains well. In two other cases a definite benign stenosis of the pylorus was found. In a fourth case, a cirrhosis of the stomach was present. A detailed report of this case was published in the March number of the Annals of Surgery, 1904.

BIBLIOGRAPHY.

¹ Turck. Journal of the American Medical Association, March 26, 1904.

² Kemp. Medical News, April 6, 1904.

Mayo. Medical News, April 16, 1904.

⁴ Cunningham. Annals of Surgery, April, 1904.

- Robson London Lancet, November 26, 1808, p 1302
- Fleiner Arch f Verdaungskr, Berlin, 1895, vol 1, p 243
- Carnegie Quoted by Cunningham, Annals of Surgery, April, 1904
- *Carion and Hallion La Semaine Médicale, Paris, August 31, 1895
- Pawlow and Katschkowsky The Work of the Digestive Glands, Eng
- lish translation, London, 1902, p 175
- Bwald Diseases of the Stomach, American Transactions, 1899, p 461 "Lohrisch Deutsche Arch f klin Med, vol 1xxix, Nos 5, 6
- " Waterhouse British Medical Journal, July 16, 1904
- "Murphy and Ochsner Personal communication

CONTRIBUTION TO THE SURGERY OF GASTRIC ULCER.

BY J. NIEMACK, M.D.,

OF CHARLES CITY, IOWA.

CASE I.—Traumatic Ulcer of Stomach; Profuse Hæmatemesis; Gastrotomy; Detection and Ligation of Ulcerated Area; Recovery.

H. M., twenty years old. No previous diseases, family his-Two weeks ago, while pitching hay, he broke the handle of the pitchfork and tumbled backward, bending his spine and overstretching his abdomen. He kept on working, and felt all right in every way until a few days ago, when a slight but daily increasing discomfort in the left hypogastrium began. This feeling finally disabled him from work and made him seek medical aid. He is a sturdy-looking farmer of middle size, does not look sick. On examination nothing abnormal is found in any of his organs, except a slight soreness over a distinct area in the left hypogastrium. He received a tablespoonful of castor oil, and as there was no movement after six hours, a soap enema was given and his lower abdomen gently massaged. The large ensuing movement was partly yellow, partly tarry. Before he got up from the chair he fainted, and vomited nearly two quarts of fresh blood mixed with black clots. He was at once carried to bed; a light ice-bag applied over the stomach, bismuth and adrenalin given by mouth; light feeding by rectum. On the third day an acute pain was complained of over the ascending colon, which made the nurse apply an ice-bag over this place. In the following night he was taken with another hæmorrhage of nearly a quart. No other stimulants were used, although patient felt pretty weak; but the same medication as before continued and immediate operation advised. His pulse had risen from 64 to 88, and remained of fair quality.

Upon the presumption that he was suffering from a traumatic ulceration of the stomach, the abdomen was opened, but neither inspection nor palpation revealed the site of an ulcer. A vertical incision was then made through the stomach wall, and with a large speculum and an electric headlight a patient search for the ulceration was instituted, starting to the left, where soreness had been complained of The chloroform narcosis was well borne, and at the end of nearly an hour a shiny white spot of about a bean's size to the right of the spine and on the posterior wall of the stomach came into sight With long forceps this part was raised out of the abdomen at the same time removing the speculum, and a silk thread catching mucosa and muscularis was carried round the defect. The bismuth thrombus evidently occluded a perforation in a large ascending artery string was now tied, without removing the supposedly aseptic thrombus sufficiently tight to bring close together, but not to bleach, the included mucosa, and the parts dropped back. There was no more bleeding and no other ulcerations were found The stomach incision was closed by three rows of suture and the abdominal wound closed in the usual way. For two weeks patient was fed by rectum and after three weeks discharged, with care ful injunctions as to his diet

The intestines had not had any rough handling, in fact, except for the first palpation, the stomach was never touched by the
fingers. There was never any pain nor vomiting, though the patient had been under chloroform more than two hours. He has
been perfectly well, doing hard farm work for the last fourteen
months.*

The following points deserve attention. First The place of soreness did not correspond to the location of the lesion, and time might have been saved by concentrating the attention from the beginning to the pyloric half where such lesions are usually found. Second The location of the ulcer seems to uphold the theory that it is the pressure of the spine against the full stomach which causes traumatic ulcers in similar conditions. Third The fact that the white bismuth thrombus freed superficially from the admixture of blood by digestion gave great help in locating the trouble makes it advisable to

^{*}Since his operation the New York Life has issued an insurance policy on his life.

give large doses of this drug during or right after a gastric hæmorrhage, that it may be included in the thrombus if surgical intervention is intended. Fourth. This patient is certainly better off than he would be if, following the fashion, we had performed gastro-enterostomy, and for acute hæmorrhagic ulceration our proceedings should always be considered the ideal operation.

CASE II.—Annular Ulceration at Pyloric Region of Stomach; Stenosis of Pylorus; Perforation of Stomach Wall, with Formation of Post-gastric Cavity confined by Inflammatory Adhesions; Posterior Gastro-enterostomy; Death.

Mrs. E. S., aged forty-eight years, had been troubled with indigestion, pain in the stomach, vomiting, and costiveness since girlhood. A year and a half ago I saw her first in consultation. She had been vomiting large amounts of nearly clear fluid, was unable to retain anything in her stomach, and had very severe pain in the right epigastrium. She was poorly nourished, with a sallow complexion and an expression of suffering; pulse, 100; temperature, 99.5° to 101° F. Her tongue was red and glossy; her teeth had lost their ivory, looking rather transparent like horn; her breath had an intense odor like chloroform. Urine, light colored, gave the diacetic acid reaction; she was belching up gas at frequent intervals. Through the thin abdominal walls the stomach could be felt ballooned, but little enlarged; to the right, just below the ribs, was an induration about three inches in diameter very painful to touch; the percussion note here was dull tympanitic. Vomitus contained much hydrochloric acid, and had a strong peptic action. Diagnosis, hyperchlorhydria, chronic ulcer, with perforation and perigastric adhesions near the pylorus. She eventually recovered from this attack, but a slight induration and pain remained. She has had about eight similar attacks since, but much lighter, till her coming to the hospital, December 19, 1903.

Operation had been most urgently advised from the beginning, but for business reasons she had postponed it again and again. Her intermediary attacks lasted from four to eight days, after which time she felt well and able to digest her food. She finally allowed herself to be taken to the hospital after ten days had gone by without any improvement. Since the fourth day her

bowel had become intolerant to rectal feeding. At laparotomy the pyloric part of the stomach was found transformed into a large tumor with smooth surface adherent towards the spine. A posterior gastro enterostomy was done by the McGraw ligature and the abdomen closed. The operation had been speedily done under chloroform and the patient rallied on the table. No shock For six hours she did well, cheerfully talking to her relatives, later complained of slight pain. She received an eighth of mor phine, then gradually sank, and twenty hours later was dead Vigorous stimulation with adrenalin, strychnine, hypodermocly sis were of no avail. The respiration stopped long before the heart ceased beating

Post mortem after opening the stomach the walls were found atrophic, the pyloric part surrounded by a broad annular ulceration with pouting outlines, the pylorus itself was transformed into a small triangular slit permeable for a probe, the surrounding tissue of cartilaginous hardness Immediately above the pyloric opening the ulceration had dissected loose a bean shaped piece of the indurated stomach wall, which was still ad herent for a quarter of an inch by a thin bridge to its original position, and could be made to drop down like a valve in front of the pyloric opening, closing it perfectly. Directly backward from the pylorus was a smooth opening permeable for the tip of the little finger, this led into a cavity of about two inches in diameter, with smooth surface obliterating the Winslow fora men. pancreas and omentum formed the walls of this cavity No changes in or around the gall bladder Microscopically. malignancy was excluded

The manution had been caused by this strange valve formation at the pylorus which evidently had developed but lately During the last year of her life the patient had repeatedly observed that by making pressure on the epigastrium over the tumor she could relieve a heavy feeling that came on during diges inon, and immediately would belch up a great deal of gas. A condition like this may easily lead to the diagnosis of hour glass stomach. How much the circumstance of her pancreas being exposed to the gastric juice may have had to do with the diacettic and formation in her system can only be suspected.

CASE III —Gastric Dilatation with Perforating Ulcer marked by Symptoms of Appendicatis, Tetany, Hamalemens, Death

Miss M. R., aged sixteen years, was seen in consultation with Dr. Miner. She was a tall, slender, pale, poorly nourished girl. For a few days she had experienced pain of a continuous character which extended from her back and right hypochondrium into the right leg. She walked with a limp. Temperature, 103° F.; pulse, 110. Abdomen not rigid, sore to touch in the lower right quadrant; her face did not express pain, but she looked tired. Tongue red, no headache. Slight nausea had existed for a few days, but no vomiting; bowels costive, urine free, pressure on McBurney's point was distinctly painful. Nowhere else could any pain be elicited by pressure. The hip-joint was perfectly free. Castor oil, with absolute rest and no feeding, was ordered. Temperature rose in six hours to 105 degrees, pulse 112. On the following morning, after several good bowel movements and a very restless night, temperature was 105° F., pulse 118, other conditions same as before, no tumor formation over the right No enlargement of spleen. A diagnosis was made of appendicitis, probably gangrenosa, and operation was performed. On opening the abdomen by muscle splitting, the appendix looked pretty normal; there were no adhesions. It was removed and found filled with tomato seeds and a yellowish brown ill-smelling pulp down to the tip. There was no stricture. It was noticed that the ileum looked slightly purplish and the liver came down an inch and a half below the ribs in the axillary line. Peritoneum as far as visible had the normal gloss everywhere. The wound was closed and further developments awaited. The temperature fell steadily, till on the evening of the second day it was 100.7° F., pulse 100. She had taken milk whey and liquid peptonoids during the day and slept well that night. Became restless and irrational on the third afternoon. On the fourth morning, temperature 100.3° F., pulse 108. She was nearly unconscious, had to be catheterized. Slight icterus. On the fifth day deep coma, urine passed involuntarily, rectal injections were not retained, jaundice fully developed. No abdominal facies. Her jaws were tightly set, arms and legs in continual incoordinate motion, temperature and pulse went up. Abdomen full, not rigid; no bowel movement since operation; frequent singultus. The lower left side of the abdomen was bulging, dull on percussion with large wave of fluctuation. Wound looked and felt normal. Over the lower lateral part of the liver there was a feeling of crepitation like air below the abdominal

walls After forcing the jaws open, a stomach-tube was introduced, and nearly three quarts of dark bloody fluid with some larger blood clots removed, a great amount of gas passed out through the tube Immediately the abdomen collapsed and became The wound and neighborhood were found to be absolutely normal, percussion of the sides now gave no dulness On the sixth day temperature nearly 103° F, pulse between 120 and 150, nutrient enemata not retained, very little urine voided involuntarily The clinical picture of telany was now fully developed Hypodermic strychnine, adrenalin, and large saline infusions On the sixth and seventh days four hot baths of 110 degrees were given Her temperature averaged 102° F, pulse 130 On the eighth day the tetany movements had perfectly ceased, jaundice had nearly disappeared, and consciousness had returned. Her pulse had gone down to 108 She was given fluid by mouth Diuresis was started so that she voided altogether, spontaneously, fifty ounces of high colored urine within thirty hours Some hard pieces were removed from the bowels by enema. But temperature rose again to 105° F and pulse to 150 A test with the stomach tube after the first twenty hours of feeding by mouth gave only one ounce of greenish fluid, so feeding was continued Nevertheless, the bulging over the left iliac region and the jaundice in creased again, singultus came on, and the next time the stomachtube brought away over a quart of nearly pure blood. The body became covered with petechial hæmorrhages, the wound began to bleed. She died on the eleventh day. No post mortem was allowed I highly regret this latter circumstance, nevertheless, I deem it opportune to report the case. The diagnosis made on fifth day has been gastric dilatation with perforating ulcer, tetany, hepatoptosis, icterus caused by kinking of the gall-ducts from traction on duodenum and liver

The impossibility of getting any fluid beyond the sigmoid flexure was evidently due to the gastrectasia Possibly there were adhesions. The girl died from highest emaciation and intoxication. Getting nourishment into her had been for days the indicatio intalis, and as the rectal route remained impossible we had to feed by mouth With what promising results, the diuresis shows But the immediate relapse of gastric dilatation brought on the end I especially wish to call attention to the marked influence of the hot baths upon her neryous condition

The diagnosis of gangrenous appendicitis had been based upon the local soreness over McBurney's point with radiating pains in right side and leg, nausea, high fever increasing even after bowel movement, high pulse-rate, absence of palpable adhesions, and absence of any other detectable conditions which might account for the fever. With this diagnosis fairly established immediate operation was imperative. Her fever fell after operation in a way that would seem to substantiate the diagnosis. dition of the ileum raised the question of typhoid, but the clinical facts did not uphold this idea. The girl had the habitus of general splanchnoptosis. I cannot lay the gastric dilatation to a belated influence of the narcosis, which was short, light, and not followed by nausea or shock. There was no septic peritonitis; in consequence, the only explanation for aseptic air-bubbles in abdomen is offered by accepting a small gastric perforation. With this diagnosis once suggested, gastro-enterostomy would have been performed at the earliest possible chance. This chance never came.

PENETRATING WOUNDS OF THE ABDOMEN.1

REPORT OF SIX CASES OF GUNSHOT AND STAB WOUNDS OF THE ABDOMEN

BY FRANK LE MOYNE HUPP, MD.

OF WHEELING, W VA,

Surgeon to the City Hospital

In the past eighteen months, six cases of penetrating wounds of the abdomen have come under the writer's personal observation. Five were pistol shot wounds of the abdomen and one was a case of stab wound of the abdomen.

Case I -Penetroting Stob Wound of the Abdomen, Wound of the Cacum, Extensive Facol Extravasation, Laparotomy, Recovery

J H M, aged twenty years, was brought to the City Hospital in a baggage-car, from Washington, Pa When visited at the B and O Station he was found to be suffering some shock, and was lying in a pool of blood and fæcal matter, his torn ab domen was covered with a filthy coffee sack

On the operating table a ragged wound was found in the right iliac region, just below and a little external to McBurney's point. Enlargement of this wound revealed an opening about an inch in length penetrating the execum. It was learned that the vulnerating weapon was a kitchen carving-kinfe, which accounted for the large and ragged nature of the wound. In the carefully made peritonical toilet a quantity of fæces and clotted blood was removed. The wound in the viscus was closed with a double row of Lembert sutures, a large glass drainage tube was inserted in the direction of the pelvis, and several cigarette drains were ad vantageously placed. The wound was closed in the usual way Patient made an uneventful recovery.

Case II—Pistol-shot Wound of the Iliocostal Space, No Evidence of Abdominal Penetration, Expectant Treatment, Re covery without Surgical Intervention

Read before the West Virginia State Medical Association May, 1904

T. H., aged thirty-four years, saloon-keeper, on the night of July 4, 1903, was shot with a .38-caliber ball at close range. The ball entered the iliocostal region on the left about one inch above the crest of the ilium.

The location of the wound, the probable course of the bullet, the absence of hæmaturia or any significant signs, and the recognition of the fact that probing is fallacious and harmful, lead to expectant and conservative measures in this case.

The skiagraph picture was unsatisfactory and failed to reveal the location of the ball.

The patient recovered without operation, and is in good health to-day.

While Case II was probably not a wound penetrating the abdomen, however, because of the location of the traumatism and the speedy recovery without symptoms, it was not thought out of place to include it in this series of cases.

CASE III.—Pistol-shot Wound of the Abdomen; Nine Perforations of the Jejuno-ileum; Abdominal Section Three Hours after the Shooting; Recovery.

A. G., aged thirty years, mill-worker, married, a resident of Martin's Ferry, and a patient of Dr. Hervey. On admission to the City Hospital on the night of June 2, 1903, patient was in shock, and an examination revealed a wound of the abdomen about two and a half inches above and a little to the left of the umbilicus.

An incision about six inches in length was made with the wound marking the mid-point. On opening the cavity of the peritoneum, it was evident that much damage had been done to the small intestine, as there was blood, fæcal matter, and some food stuff in every direction.

Many gallons of decinormal salt solution were used in cleansing the abdomen. All hæmorrhage was arrested and the openings in the intestine and mesentery were closed. The glass tube and gauze wicks were used for drainage in this case as in Case I. In one place the ball had torn the long diameter of the gut, seriously compromising the integrity of the viscus, over an area of two and a half inches, but this was repaired without resection.

The duration of the operation was almost three hours; patient left the table with a pulse of 140 and subnormal temperature.

The tube was removed on the fifth day, the first bowel move ment was on the fourth day, no food passed his lips for forty-eight hours, after that time iced panopepton seemed to satisfy his craving for nourishment until the end of the first week. Patient's recovery was most gratifying, his temperature never going beyond 99½° F He was discharged cured July 9, five weeks from the day he was shot

CASE IV -Pestal shot Wound of Abdomen, Slight Laceration of Liver, Non penetrating Wound of the Ascending Colon, Loparotomy, Recovery

W B, aged twenty-two years, negro waiter, was admitted to the City Hospital November 29, 1993, suffering with two pistol shot wounds of the abdomen There was an unusual amount of pain and well marked muscular rigidity

Patient was under the anæsthetic within one hour of the time of the shooting. On examination, one wound was found to enter the soft parts at the free border of the ribs on the left side in the mammary line. The course of this wound had every appearance of having penetrated the abdomen, but a median explorative in cision in the epigastrium demonstrated that the ball had tunnelled beneath the muscles transversely and lay under the cartilage of the seventh rib on the right, where it was easily removed.

The second ball broke the cartilage of the ninth rib on the right lobe of the liver, it severed completely one of the appendices epiploica, the base of which was bleeding rather freely. There was also a non penetrating wound of the ascending colon, extending through the muscular coat. The necessary repair was made, all bleeding arrested, and drainage applied as in the previous cases. Recovery complete and uneventful

CASE V -Pistol shot Wound of the Abdomen, Beginning Diffuse Septic Peritonitis, Thirteen Perforations of the Intestine, Laparotomy Twenty Hours after the Shooting, Recovery

W K, negro, aged eighteen years, was brought to the City Hospital, from Fairport, Ohio, by Dr Walker, of St Clairsville December 25, 1903 On admission, pulse was 120 and of poor quality, respirations somewhat labored and costal, temperature, 102° F The abdominal muscles were hard, there was some tympany Patient was unable to retain anything on his stomach for several hours before admission. He had been shot by an Italian the day

before, the ball entering the abdomen one inch below the umbilicus, almost in the median line.

Under ether anæsthesia, an ample incision was made in the median line.

On opening the peritoneal cavity, it was evident that there had been considerable loss of blood, and this was lying in puddles with half-digested food and fæcal matter.

Already a progressive fibrinopurulent peritonitis was beginning to show itself, in flakes of tenacious yellowish material deposited over the surface of the intestinal coils. Thirteen perforations were found and repaired, using a double row of Lembert sutures for each opening.

The toilet of the abdominal cavity and carefully directed drainage were practised as in the previous cases.

It is interesting to reflect with Douglas ("Surgical Diseases of the Abdomen," p. 17) that the peritoneal cavity into which this poisonous material is suddenly deposited is lined with a membrane which is tunnelled with measureless lymph and blood tubes, and that this membrane is in extent perhaps as great as the whole integument of the body, and capable of absorbing in a single hour from 3 to 8 per cent. of the entire body weight; hence the call for immediate interference in all of these cases.

The reason for the delay in this case was, however, unavoidable; the accident having occurred remote from a railroad and many miles from any medical aid.

The drainage tube was removed on the sixth day, and recovery was complete and uninterrupted. Patient was dismissed well in one month from the day he was admitted.

Case VI.—Pistol-shot Wound of the Abdomen; Eight Perforations of the Intestines; Profuse Hæmorrhage and Shock on Admission; Laparotomy; Death.

J. C., aged twenty-six years, Italian, was shot by a policeman at Bellaire, Ohio, January 10, 1903. He was admitted to the City Hospital, about four hours after the shooting, in profound shock, with a bullet wound two inches below and to the right of the umbilicus.

Under chloroform narcosis the abdomen was opened, and there immediately gushed out a quantity of blood.

The hæmorrhage was from the mesosigmoid and was soon arrested, but not until the patient had been almost exsanguinated.

There were six perforations of the intestine, but very little escape of intestinal contents

The necessary repair was made in this case and every effort made to restore the depleted circulation, but all to no avail. The patient never rallied from the original depression, dying in about twenty hours after admission.

Certain conclusions seem to be evident in reviewing the histories of a series of cases of this kind

First recognizing that visceral injury follows in 97 per cent (Douglas) of penetrating gunshot wounds of the abdomen, immediate laparotomy, with a liberal incision, should be practised in every such case

practised in every such case

Second, the symptoms exhibited by the patient, the location of the wound, and the course of the bullet should rather be used for determining the presence or absence of penetration, as the use of the probe is not only harmful, but may lead to

false conclusions

Third, well directed drainage in all cases in which there has been visceral perforation is of the greatest importance

HEPATO-CHOLANGIO-JEJUNOSTOMY.

FOR COMPLETE CICATRICIAL OBSTRUCTION OF THE HEPATIC AND COMMON DUCTS.

BY A. ERNEST MAYLARD, M.B., B.S. (LOND.), of GLASGOW,

Surgeon to the Victoria Infirmary.

ALTHOUGH the clinical aspect of the case I am about to report presents many features of peculiar interest, it is more with the particular operation performed that I am induced to publish it.

I will first narrate the history of the case and conclude with my remarks upon it.

W. McC., aged fifty-two years was admitted into the Victoria Infirmary on September 12, 1899, complaining of pain in his stomach, and vomiting. The onset of his symptoms he attributed to an accident which occurred twenty-two years ago, when he was struck over the lower ribs on the right side while at his work on the railway. This was immediately followed by a severe pain at the seat of injury which continued for several weeks. The pain lessened, and for a time he remained free for intervals sometimes of months. Some of these intermittent attacks were exceptionally severe, and on one occasion, about two years ago, an attack was accompanied by hiccough and vomiting for twelve days afterwards. He generally noticed after an attack some yellowness of his skin and conjunctiva, and on one attack, three years ago, there was severe jaundice which lasted for three weeks. The seat of the acute pain was usually in the epigastrium.

On September 23 the abdomen was opened in the middle line above the umbilicus, and, as the mischief was discovered in the region of the gall-bladder, a second incision running transverse to the first had to be made. On digitally exploring the involved region it was found that the gall-bladder had become, or was replaced by, a shrunken, indurated mass of tissue, em-

bracing in the matted area the liver, the pyloric end of the stomach, and the hepatic end of the transverse colon. The stomach was not dilated. An exploratory incision was made into it and the pyloric orifice digitally examined. No puckering as the result of inferation could be detected, nor was the pylorius or the first two inches of the duodenium in any way obstructed. The colon was similarly opened and the involved region digitally examined. No constriction could be detected, but directly opposite the most markedly indurated mass a slight indentation was felt, suggestive of the possible healing of an opening through which a gall stone might have passed.

There being no obstruction either about the colon or the pylorus, it was deemed unadvisable to attempt the severe meas ure of separating the intimately attached viscera. The wound was therefore closed

On December 12, that is about eleven weeks after his operation, the patient reported himself, and the note taken of his condition at that time was, that he had gained ten pounds in weight and he was quite free from his old pain, which he never now felt

The patient was lost sight of for nearly four years, when he presented himself at the hospital on October 1, 1903. The report of his condition at this time was that up to about three months ago he had enjoyed good health, but at this time he began to get jaundiced. He never, however, suffered any pain, and he had been able to keep to his work till about two weeks ago. On examination, he was seen to be very poorly nourished and muscles very flabby. His skin was of a uniformly yellow color all over his body. His appetite was very poor and he took very little food. Abdominal palpation revealed nothing,—no apparent enlargement of liver or dilatation of stomach. There was a marked ventral herma at the upper part of the median cicatrix. The urine was deeply bile stained and the fæces clay colored.

On seeing the man on the present occasion, I felt that his jaundice possibly depended on some chronic obstruction to the hepatic or common duct, and, remembering the difficulties that I had experienced at the first operation, I could not see my way to make any further attempt to deal with it by re-exposing the parts The patient accordingly left the Infirmary

He presented himself again about seven months later on May 17, 1904, desirous that I would do something to remedy the ventral hernia, which was a source of trouble to him. His general condition had undergone very little change. His skin was still deeply bile-stained, and he presented all the symptoms of obstructive jaundice.

Believing the case to be one of chronic obstructive jaundice due to constriction either of the hepatic or common duct by old inflammatory adhesions, I determined to attempt a method which had been adopted successfully by Professor Kehr, of Halberstadt, in a similar case, that is to say, establish a communication between the dilated ducts in the liver substance and the duodenum.

The following operation was therefore performed:

The abdomen was opened by an incision along the course of the old transverse cicatrix and extended both in front and backward to give the required amount of room. Extreme matting of parts was encountered, and, although portions of adherent omentum were removed, it was found quite impossible to distinguish the pylorus and duodenum. The liver, which was much shrunken and of a deep mottled purple color, lay high up under the ribs. With the kind assistance of my colleagues, Dr. Grant Andrew and Dr. Elizabeth Pace, I was enabled, though with much difficulty, to stitch the jejunum to the margin of the liver for about two inches by means of a continuous sulphochromic-gut stitch. The liver was then incised for about one and a half inches, the bowel opened for the same extent, and the opposing surfaces beyond the two cuts were united by interrupted stitches.

The extreme friability of the liver and the depth at which we had to work rendered this part of the operation one of great difficulty. In order to avoid any possible tension on the stitched gut, for it seemed almost impossible for the stitches to secure a hold, the bowel was anchored at the upper part to some adherent omentum to relieve any possible strain on the bowel stitches. A separate incision was made posteriorly to drain the right lumbar fossa. It should have been noted that after deeply incising the liver there was very free oozing of dark purple fluid, which was to some extent checked by the application of the actual cautery.

The anæsthetic was given by Dr. David Lamb, and the operation lasted for an hour and fifty minutes. The patient was

a little sick after the operation, but otherwise he bore it well He made an uninterrupted recovery, neither temperature nor pulse rising. On the second day after operation, it was thought that his motions were somewhat darker in color, but further than this transitory result, no other change in his general condition seems to have occurred. He left the hospital eleven days after the operation in order to be under his own medical attendant at home.

I saw him on June 16, when his wound was nearly healed, the only real difference in his general condition being that of slowly increasing emaciation and weakness. This condition of exhaustion seemed slowly to increase until lie died about a month later. There was unfortunately no post mortem.

Remarks—A feature of special interest in the clinical his tory of the case concerns the injury which the man stated he received some twenty years ago, and from which time he dated his illness. The blow which he received over the lower ribs of the right side seems to have been a severe one, for not only was it followed by acute pain in the region, but for several weeks he was laid up with it. Except for this history of an injury, and the fact that pain had occurred off and on since its receipt at the seat of the blow, there was little else in the clinical symptoms to suggest what otherwise might have been regarded as a case of gall stones, with such complications as are well enough known to accompany their impaction.

Even supposing no serious traumatic lesion had taken place in the deep parts about the region of the gall bladder and ducts, it is still possible that gall stones may have been present in the gall bladder at the time of the accident, and through forcible dislodgement become the source subsequently of the symptoms from which the patient suffered

At the time however, of the first operation, I was, rightly or wrongly, lead to believe that the adhesions encountered, being so extensive and so dense, must have owed their origin to traumatism, and not to have been solely the result of in flammatory mischief secondary to impacted gall-stones. If gall-stones were at the bottom of the mischief, the adhesions

were certainly denser and more extensive than any I had previously encountered in operating for this condition. Having explored both the interior of the pylorus and the duodenum, and also examined the canal of that part of the colon involved in the matted mass, and finding that these channels were free and unobstructed, I did not attempt to detach the parts.

I need not follow the history of the case further. Chronic jaundice later set in, with none of the old attacks of pain. Emaciation and weakness slowly increased. If the ducts were becoming, or had become, completely blocked, as I believed by stricture or cicatricial contraction, any attempt to deal with the affected parts was out of the question, for if the separation of the adhesions was not possible at the first operation, I did not think it likely that I should be any more successful in a second attempt. Further, I was not able to entirely remove from my mind the thought that, though the long history of the case did not point to carcinoma at an earlier stage of his trouble, it was not out of the question that his later symptoms owed their manifestation to such a development; and the more possible did this aspect of the case appear, if, after all, gall-stones were at the bottom of the mischief.

There seemed to me, therefore, only one way of attempting to circumvent the difficulty, and that was by establishing a fistulous communication between the dilated bile ducts in the liver and the small intestine. I had as a precedent for such a proceeding a case recorded by Professor Hans Kehr. of Halberstadt, who, in a case of cicatricial contraction of the hepatic duct following,—it is supposed, upon a chronic duodenal ulcer,—succeeded in establishing a communication between the liver and the first part of the duodenum. There was one point of considerable difference in comparing the two cases, which rendered my own one of special difficulty and of doubtful purpose to deal with. While in Kehr's case the liver was moderately enlarged, in mine it was greatly shrunken. The history of the two cases probably accounted for this difference; for in Kehr's the symptoms were only of about a year's duration, in mine they dated back for several years; so that the gland in

the one case had not gone beyond the stage of bihary engorgement and active secreting power, in the other it had reached the stage of atrophy, and probably, therefore, diminished power of secretion. Another point of distinction between the two cases was that, while Kehr was able to unite the duodenum to the liver, I could only secure the jejunum at about from six to eight inches from the duodenojejunal bend, for, as has been already stated, the adhesions were so dense and extensive that I could not distinguish the duodenum

The deeply situated and atrophied condition of the liver rendered it not possible for me to follow the course adopted by Kehr He excised a portion of the liver six centimetres long and from two to three broad, and deepened the wound with Paquein's cautery I, on the other hand, had only room enough to make a simple incision and enlarge it somewhat with the cautery It was owing to this incomplete opening into the liver that rendered it impossible for any marked result in the way of permanent drainage of the gall ducts to take place For, although there was some darkening of the motions noticed afterwards, it was quite temporary, and there is but little doubt that the wound in the liver healed, thus checking any further outflow of bile, supposing the hepatic cells were not too atrophied to secrete As the man recovered perfectly well from the operation, it was my intention later to have opened the jejunum on the side opposite to that stitched to the liver, and then attempt to remove a sufficient amount of the hepatic substance to insure of a permanent fistulous com munication with the bowel I saw the patient shortly before leaving for my holidays, but on my return I learned that he had died from gradually increasing exhaustion. Unfortunately, there was no post mortem so that the question of calculus or malignant disease must still remain an unsolved question in the case

The case recorded by Professor Kehr was operated upon on January 8, 1904 Four days after the operation, it was noted that the stools were brown, the urine much clearer, and the icterus less, and on February 6, four weeks after, when

the last note is made, the patient is stated as being much better and putting on weight.

The conception of the operation appears to have arisen with Marcel Baudouin in 1896, and Langenbuch in 1897; but to Kehr belongs the credit of having first successfully put it into execution. Kehr published his case in the Zentralblatt für Chirurgie of February 20, 1904, and in his comments upon it points out, what is equally well shown in my case, that the exposure of the raw hepatic surface to the interior of the intestinal canal was not followed by any rise of temperature or other indication of septic disturbance.

It is probable that the operation is one that will be but rarely called for, and then only for such cases where the hepatic or common duct is so inextricably involved in adhesions that they cannot be freed. But whenever its execution may seem desirable, these two cases appear to indicate that it may be safely undertaken without any fear of any immediate or comparatively remote dangerous effects.

VOLVULUS OF THE CÆCUM

WITH AN ACCOUNT OF MARE AND POSSIBLY COMMON CASES

BY EDRED M CORNER, MB, BC (CANTAB), FRCS, OF LONDON.

Surgeon to Out Patients St. Thomas a Hosp tal. Assistant Surgeon. Hosp tal for Sick Children Great Ormond Street

AND

PERCY W G SARGENT MB, BC (CANTAB), FRCS OF LONDON

Resident Assistant Surgeon St Thomas a Hospital

It is true in the history of a disease that it is often first recognized in its most acute or fatal forms. Later less acute varieties are found to exist and it is the study of these milder cases which throws light on the pathology of the more severe and less common condition.

In this communication we deal with fifty seven cases of cæcal volvulus and from the study of these comparatively rare and acute cases suggest that we have recognized a far more common and less acute condition. It is to introduce this that we have been led to analyze such cases as we have been able to find in the literature together with some which have fallen under our own notice For permission to make use of the latter, we have to thank those members of the Staff of St Thomas's Hospital under whom they were admitted. If we are right, something will have been done to relieve the vermi form appendix of a little of its evil reputation, and perhaps to explain some of those not uncommon cases of recurrent attacks of abdominal pain with fulness and tenderness in the right iliac fossa, constipation, and vomiting, but unaccompanied by fever, which may be brought on by exertion or some other slight cause, and which pass off in the course of a few hours

We do not lose sight of the fact that in such cases the appendix will probably undergo secondary inflammatory

changes which may at any moment become so acute as to overshadow completely the cæcal condition.

CASE I .- Volvulus of Cacum; Resection; Death.

M. T., a cellar-man, aged forty-six years, was admitted under Mr. Clutton on May 7, 1903. A stone had been removed from the left kidney seven years previously. Habitually somewhat constipated, he was seized rather suddenly, four days before admission, with acute pain in the left inguinal region, which rapidly He vomited twice on became diffused over the whole abdomen. the second day, and once on the third day, but not again. The bowels were opened on the second day, but since that time neither fæces nor flatus had passed. On admission, the abdomen was somewhat rigid, distended, tender, and moving only slightly with respiration. There was a trace of albumen in the urine. The pulse was 60 and the temperature normal. Enemata were given without result. The man did not appear very ill, there was no more vomiting, and the tongue, though furred, was moist. About twelve hours after admission it was decided to operate. The abdomen was opened by a mid-line incision below the umbilicus. The enormously distended cæcum presented and was tapped, a large amount of fluid fæces, containing myriads of thread worms, and a large quantity of gas being evacuated. The twist was from right to left at a point about half-way up the ascending colon, and the involved gut was gangrenous. It was therefore resected, the colic end being closed and a Paul's tube being tied into the ileum. Death took place on the sixth day, and at the autopsy general peritonitis was found.

CASE II .- Volvulus of Cacum; Resection; Death.

R. S., a lighterman, fifty years of age, was admitted under Mr. Clutton on May 2, 1903. He had had no previous attack of abdominal pain. He was taken ill six days before admission; the symptoms progressed gradually, and vomiting had been occasional. On admission, the abdomen was greatly distended, moving badly on respiration, and peristaltic movements could be felt and heard, but not seen. The pulse was 106, regular, and of good volume. Nothing had been passed per rectum since the onset of the illness. The tongue was furred and dry, and the urine slightly albuminous. Considering that the obstruction was of six days' duration, the general condition was not very bad.

The abdomen was opened through the left rectus The cecum, enormously distended, occupied the greater part of the abdominal cavity, and was rotated in such a way as to bring the caput cæci to lie against the spleen, the parts involved being the cæcum, ascending colon, and four inches of the lleum. The cæcum was gangrenous and was resected, the colic end being closed, and a Paul's tube being tied into the ileum. The peritoneal cavity was washed with saline solution and the abdomen closed.

Death occurred fourteen hours later At the autopsy general perstonuts was found

Case III -Volvulus of the Cacum, Death

M, male, aged forty-five years, was admitted to St Thomas's Hospital on September 14, 1902 Previously he had suffered from irregular attacks of intestinal obstruction. For a week previous to admission he had suffered from "abdominal trouble," pain, occasional sickness, etc. which had become acute for the last two days He was a heavy drinker, and had subacute delirium tremens for the four days before admission. The man was obviously very ill The abdomen was distended, moved upon respiration, was more tender upon palpation than upon percussion, it was resonant all over and held more or less rigid. Under chloroform an incision was made through the lower part of the right rectus abdominis muscle The sigmoid was found to be collapsed and the small intestines very distended, the caecum could not be found. The incision was extended upward. In the situation of the stomach was found an enormously and tightly distended viscus, which proved to be the cæcum. It had twisted on itself, and lay in the left hypochondrium in relation to the spleen The cæcum was delivered and untwisted, when the caput coli was found to be gangrenous in two places. After tapping, the necrotic places were invaginated and a Paul's tube inserted. thus fixing the excum in its normal position. The colon now filled up, and it was observed that the ascending colon and the right limb of the transverse colon were close and parallel to each other, being joined by a congenital malformation of the great omentum The execum was free, and it had twisted on the "fixed" point of the abnormal mesentery The congenital mesentery was divided and the abdomen closed There was much shock, and the patient died in twenty-four hours

Post mortem by Dr Harold Singer "The abdomen only

was examined. The tip of the cæcum had been brought outside and a Paul's tube inserted. The wound looked healthy. No peritonitis. The cæcum was empty but much dilated, and the intestines above were also distended. The transverse colon and parts below the cæcum were practically empty. There was no mark on the bowel at the place where the twist had occurred (as was noticed at the operation)."

The abnormality of the mesentery is described thus:

"The mesentery of the small intestine was attached as usual. The cæcum was provided with a very long mesentery, which was not attached to the right iliac fossa, nor along the normal course of the ascending colon, but passed directly upward to the transverse colon to become attached near the middle line. Part of this had been divided on the left of the cæcum at the operation. Consequently, it and ascending colon were now extremely movable, though the latter had been more fixed at the time of the operation." The obstruction was at the hepatic flexure and due to the sharp bending forming a spur, and so a valve which was firmly closed by the distention of the cæcum.

CASE IV .- Acute Volvulus of the Cacum; Death.

W. H., male, aged twenty-nine years, was admitted to St. Thomas's Hospital, September 5, 1902, under the care of Mr. F. C. Abbott. The abdomen had been opened, but, owing to the difficulty of finding the whereabouts of strictures, a Paul's tube only was inserted, the man's condition allowing of no prolonged search. The following are notes of the post-mortem examination:

"The abdomen had been opened through the right rectus. The intestines were adherent to the scar and matted together. This peritonitis was local. In the middle line, immediately below the costal angle, the enormously dilated and nearly empty cæcum was found lying immediately beneath the wound. The cæcum passed downward and slightly to the right, and then the ascending colon passed behind the mesentery of the small intestine, upward and towards the left. The transverse colon was small and close to the spleen, lying to the left of the stomach. The gut then passed down the left side to the sigmoid. The cæcum had a long mesentery and the ascending colon none at all. The transverse mesocolon and the great omentum were on the left side of the abdomen, being curled up just below the spleen. The mesentery

of the small intestine was unusually long, and a firm band crossed the ascending colon when the execum was displaced upward At the operation the execum had been found in the left hypo-

At the operation the execum had been found in the left hypochondrium in relation to the spleen

CASE V—Heocolic colic Iniussusception, Secondary Ob-

Secondary Ovstruction, due to a Congenital Malformation of the Mesentery unth Volvulus and Avial Rotation of the Cacum, Ascending and Transverse Colons

L B, aged ten months, was admitted under Dr Box for intussusception At the operation a double intussusception was found and reduced Death occurred about forty five hours after the operation The autopsy was made by Dr Singer, of Omaha, USA, from whose report the following is an abstract

"On opening the abdomen, a coil of large intestine stood out prominently on the left side, it then curved upward and to the right, then backward and to the right behind the coils of small intestine. The great omentum could not at first be seen, but was found curled up, lying above the transverse colon, which was found curled up, lying above the transverse colon, which was turned over so that its posterior surface looked to the front. The cæcum and the ascending colon were provided with an extremely long mesentery, and the former had passed behind the small intestine upward and to the left, so that it was lying a short distance from the spleen. It had made a half twist in getting into this position, but was not completely obstructed. The cæcum, ascend ing colon, and the transverse colon were distended, whilst the sigmoid and rectum were very small, and had no mesentery at all. There was no absolute cause of obstruction to be seen. There was no perhotnuts or other serio of disease."

It is scarcely necessary to add that the above cannot represent the position in which the viscera were put at the operation

The following is a brief analysis of all the cases which we have been able to consult. The total number examined was fifty seven, of which forty two were males, thirteen females, and in two the sex was unstated. It would thus appear that volvulus of the execum is three times more frequent in men than women

With respect to age, volvulus of the cæcum has been described in every decade up to 80 years of age The youngest

subject was nineteen days, the next one ten months, the oldest was over 70. Under 5 years, 3 cases; 5 to 10 years, 1 case; 10 to 20 years, 7 cases; 20 to 30 years, 15 cases; 30 to 40 years, 14 cases; 40 to 50 years, 7 cases; 50 to 60 years, 4 cases; 60 to 70 years, 2 cases; 70 to 80 years, 1 case. Described as "adult," I case; age unstated, 2 cases.

Just over half the cases are found between the ages of 20 and 40.

It has long been taught that volvulus is one of the most acute of all the forms of intestinal obstruction. So far as the cæcum is concerned, the clinical history of the cases under consideration is in contradiction to this teaching, especially when it is remembered that many of the patients have previously had and recovered from definite attacks of subacute intestinal obstruction. By means of tabulating the length of the illness in the cases of volvulus of the cæcum, the fallacy becomes at once apparent.

Under 24 hours, 7 cases; I to 2 days, 2 cases; 2 to 3 days, 6 cases; 3 to 4 days, 6 cases; 4 to 5 days, 4 cases; 5 to 6 days, 4 cases; 6 to 7 days, I case; 8 to 14 days, 10 cases; 15 to 21 days, 3 cases. Unstated, 10 cases; described as "chronic," 4 cases; or, up to I week, 30 cases; I to 2 weeks, 10 cases; 2 to 3 weeks, 3 cases.

From the above it can be seen that acute, subacute, and chronic varieties exist. Moreover, a number of the cases had suffered premonitory attacks of abdominal pain, and vomiting; the last attack only differing in degree from the previous ones.

Although figures giving the ratio of cases which are cured to those which die are most misleading, we may state that of the fifty-seven, nineteen were operated on and recovered, whilst the other thirty-eight died, of whom twenty-one were operated upon. The total mortality would therefore appear to be 66 per cent., whilst the mortality after operation works out at 52.5 per cent.

The Position of the Displaced Cæcum.—The cæcum has been found in every region of the abdomen, and has even formed a volvulus outside the abdomen, viz., in the sac of an

inguinal hernia. In this connection it may be remarked that the execum is frequently found in the strangulated or obstructed right inguinal hernia of children, and when distended with gas is almost always twisted. In the thirty three instances in which its position is noted, it has been found in the right lumbar region in I case, right hypochondrium, I case, epigas trium, 4 cases, left hypochondrium, 13 cases, left lumbar region, 6 cases, left iliac region, 1 case, umbilical region, 2 cases, pelvis, 4 cases, in a right scrotal hernia, I case

Thus the left hypochondrium is by far the most frequent situation. Here it is in relation with the spleen and stomach, lying beneath the great omentum, which is often displaced upward and to the left. Next in order of frequency comes the left lumbar region, followed by the epigastric and pelvic.

Anatomical Varieties—We have attempted to construct a concise classification of the different anatomical varieties found

- In the first variety there is a mesentery common to the whole of the small intestine, the excum, and a varying length of the colon. The root of the mesentery is in consequence much smaller and less widely spread, for practical purposes, its axis may be looked upon as that of the superior mesenteric vessels. It is round these vessels that the rotation takes place.
- 2 The second variety is derived from the first, the root of the mesentery in these cases, instead of being more or less localized to the origin of the superior mesenteric artery, extends, to a lesser degree than normal, towards the right iliac fossa. In this way the mesentery of the lower part of the ilicum is relatively shorter than that of the rest of the small intestine or the excum, and offers a more or less fixed point for the latter to rotate upon

This is the most common variety of cæcal volvulus, and is found chiefly between twenty and forty years of age

In the first variety the rotation is practically about one fixed point, so that the arc of movement described by the cæcum is the segment of a crele. In the second variety there are two fixed points, and the curve of cæcal rotation is a segment of an ellipse. Mathematically, these figures merge into

each other; so, surgically, there is every intermediate pathological form.

3. The third variety is one of rotation of the cæcum along its long axis. It is always present with the two former varieties, but may exist alone. Again, it is present in the pelvic cases, and may complicate what is merely an elongation of the caput coli.

The first and second varieties are always grafted upon some predisposing congenital abnormality of the mesentery. The third may also be grafted on a congenital malformation of the cæcum or its mesentery. But the fœtal cæcum is tapering in form, whilst those which undergo axial rotation are pouched. As the pouches are an acquired feature, this must be a purely acquired variety.

As the ileocæcal valve represents the boundary between the small intestine, which is adapted for the propulsion of liquid contents, and the large, which is modified for the passage of solids, it is in the cæcum that the products of digestion rest or pause, in order that this change of consistence may take place, a change which is effected by the absorption of moisture and the deposition of mucus. This stasis in the cæcum soon leads to its enlargement and the formation of pouches between its longitudinal bands. The consequent fermentation and gas production by the micro-organisms increase the condition. Hence there can be an acquired excessive enlargement of the cæcum which needs only some mechanical force, such as the contraction of the abdominal muscles, or even gas distention, to convert it into an axial rotation.

This point is more fully gone into in the Erasmus Wilson Lectures of 1904 and also by T. R. Elliott, *Journal of Anatomy and Physiology*, May, 1904.

We do not pretend that this simple classification includes all cases, but suggest that from these three fundamental varieties more complex forms may arise as modifications.

Our classification may therefore be summarized as follows:

I. Circular rotation; that is about one fixed point. 2.

Elliptical rotation, that is about two fixed points 3 Axial rotation, that is about the longitudinal axis

(a) Congenital (b) Acquired

It is to this acquired form of cæcal rotation that we specially wish to direct attention, and for this purpose we have analyzed the recorded cases. All the congenital forms are rare, or at least uncommon, but we believe the acquired to be neither rare nor uncommon, and it is the object of our paper to emphasize this belief. But before proceeding to deal with the case which best supports our contention, we shall refer to various points which may be gleaned from the histories of those already recorded.

Remarks upon the Previous Histories of the Recorded Cases - Those instances in which the history is simply that of ordinary acute intestinal obstruction call for no special com-But when we examine the records carefully, scanty though they are in most instances, we find that a considerable proportion give accounts of previous and recurrent attacks of abdominal trouble, or even of definite intestinal obstruction. which have passed off Such attacks vary in length of time from a few minutes to several days Some patients have been subject to them for months or years, whilst in others the premonitory attacks have preceded the final acute one by only a few days or weeks The most constant symptom is abdominal pain, which may merely amount to discomfort, or may be intensely severe. The most frequent concomitants are vomiting and maction of the bowels as regards both flatus and fæces The abdomen may rapidly become distended with gas, which in some instances forms a recognizable resonant tumor. With the passage of flatus the attack may rapidly and completely subside Possibly the increasing intracæcal gas pressure reduces the displacement of the cæcum which gives rise to the attack.

Two of the cases recorded by Fagge many years ago illustrate these points very well One was a female aged forty-five years, with a marked history of constipation A few days after

admission she began to suffer from symptoms of intestinal obstruction, not of an urgent nature. On two or three occasions there were slight fæcal evacuations which gave relief. Vomiting was present, but irregular, and all the symptoms varied from time to time. At times an indefinite tumor could be felt just to the left of the umbilicus. Death ultimately occurred from perforative peritonitis, and at the autopsy there was found a greatly distended cæcum and ascending colon rotated on its longitudinal axis.

The other case is still more striking. It is that of a man aged twenty-two years, who had had two definite attacks of abdominal pain and vomiting,—one six months, and the other three months before admission. A few days after being admitted he had a third and similar attack; and subsequently others of a like nature. The last ended fatally, after a residence of four months in the hospital. At the autopsy the displaced cæcum was found in the left loin, and death was due to perforative peritonitis.

Case of Chronic Constipation, Dilatation of the Cacum, with Attacks of Axial Rotation and Prolapse into the Pelvis; Consequent Subacute Appendicitis .- P., female, aged thirty-eight years; had recovered from a previous attack of phthisis. For many years she had suffered from constipation, which was associated with abdominal discomfort, the passage of mucus, and tenderness along the course of the colon. For the last year this pain and discomfort had been particularly localized to the right iliac fossa, making more or less of an invalid of her. There had never been a definite attack of appendicitis with elevation of temperature. The pain presented the following marked peculiarities. It was brought on by the action of purgatives, also by any action of the bowels, much less noticeably by that of the bladder, by exercise and any straining. The character of the pain was difficult to describe, and varied in intensity from a kind of pelvic discomfort to definite pain referred to the umbilical region. There were also disturbances of digestion and all the accompanying symptoms of nervousness, etc.

Examination of the abdomen revealed only tenderness on palpation over the right iliac fossa, and the appendix could be distinctly felt as a firm, thick cord, freely movable and low down on the brim of the pelvis. No pelvic examination was made. After this consultation the patient went home, and had much

pain in consequence of the handling which she had had. This attack lasted some hours. The diagnosis made was that of sub-acute appendicuts, secondary to chronic constipation and fermentation in the execum.

At the operation, after the abdomen was opened, it was found impossible to deliver the execum by ordinary means, and on exploring with the finger it was found as a tense gas containing cyst, more or less impacted in the pelvis. By passing the fingers round, it was easily freed and delivered. The execum was very large and pouched. The appendix was clamped and removed. The stump was sutured into the execum, and the stitching continued up between the anterior and external muscular bands, os as to gain two objects. The first is that by invaginating the external pouch the execum was tilted and prevented from again prolapsing into the pelvis, the second, that by typhloplication, the execum was reduced in size, a condition which would tend to limit fæcal stagnation within it. The condition of the appendix was simply one of a slight degree of chronic catarrh. The wound healed by first intention.

Since the operation, the pain following exercise and purgation has disappeared. Two months later, she was reported as being very much better and free from almost all her previous troubles.

In the first place, the excum was perfectly free to rotate The clinical history agrees with those obtained from cases proved to be volvidus of excum, and dealt with in the early part of the paper. The attacks were produced by exercise, violent movements of the diaphragm, straining, evacuations of the bowels, the action of purgatives, all of which could lead to excal rotation on its axis. The attacks varied both in duration and intensity. After a purgative it would last for "some hours," and unaccompanied by any rise of temperature. This duration is too short for any inflammatory attack. One is, therefore, forced to look for some physical condition. We believe that the explanation is to be found in some axial rotation of the excum, which imperfectly occludes the lumen of the ascending colon or ileum, the acquired dilated condition

of the cæcum (typhlectasis) being the predisposing condition, and the subacute inflammatory condition of the appendix being only an incident consequent upon the cæcal condition.

Further, a case recorded by Mr. G. H. Makins, in the Lancet, January 18, 1904, which may be quoted as an example of acute axial rotation of the cæcum which was impacted in the pelvis, exemplifies merely a superlative degree of the same condition seen in our case. In this instance there had been four or five distinct attacks of abdominal pain and vomiting over a period of eighteen months. There had been abdominal pain for ten days and complete obstruction for six. On opening the abdomen the displaced and distended cæcum was found to be so firmly impacted in the pelvis that it could not be delivered until some of the gas had been let out with a trocar. The patient made an uninterrupted recovery.

BIBLIOGRAPHY.

Acland. St. Thomas's Hospital Reports, 1899.

Andrei. Quoted by Manteuffel.

Ballance. St. Thomas's Hospital Reports, 1896.

Belcher. Deut. Zeit. f. Chirurgie, 1xiv, 48.

Broca. Gaz. des Hôp., 1897, 130.

Bruhus. St. Petersburg. med. Woch., 1883, 321.

Bryant. Lancet, 1886, ii, 963.

Burgess. Lancet, 1902, ii, 1690.

Chlumski. Wien. klin. Rundschau, 1901, xv, 581.

Coombs. New York Medical Record, 1899, lvi, 685.

Erdberg. Quoted by Manteuffel.

Fagge. Guy's Hospital Reports, xiv.

Faltin. Deutsche Zeitschrift f. Chirurgie, 1904, 354; Nordisht Med. Archiv Abtheilung Chirurgie, 1902, 4, and 1903, 1 and 2.

Feuer. Quoted by Manteuffel.

Frolich. Bull. et Mém. de Soc. de Chir., Paris, xxvii, 542.

Guinard. Bull. et Mém. de Soc. de Chir., Paris, xxvii, 542.

Hedenius. Upsal. läk. förhand., vi, 301.

Herrmann. Quoted by Manteuffel.

Holmes. System of Surgery, ii, 712.

Kaljabzo-Koreski. Jeshemedelnick., 1847, No. 48.

Key. Tr. läk. Sällsk. försh., S. 137, 1873.

Labatz. Quoted by Manteuffel.

Littlewood. Lancet, 1899, i, 428.

Lowisa Ottenson. Quoted by Manteuffel.

Makins. Lancet, 1904, i, 156.

Manteuffel Verhandl d. deutsch. Gesellsch f Chirurgie, 1898, xxvii, 546, and Sammi klin. Vortr, Lespzig 1899, 260

Nightingale Lancet, 1897, July 3 Obalinski Langenbeck's Archives, xlviii, 1894, S 16

I Owen, Lancet, 1886, 1, 828

Payne. St Thomas's Hospital Reports, 1898 Pescatore. Deut Zeit. f Chirurgie, Ixviii, 185

Pringle. Middlesex Hospital Reports, 1899, 30 Romm. Russki Chirurg Archiv., 1895, 2.

Sargent, Corner This paper (six cases)

Schiemann St. Petersburg med Woch, 1800, ii. V Wahl Langenbeck's Archives, xli

Weinreich, Centralblatt f Chir, 1899 986

AN OPERATION FOR INGUINAL HERNIA.

BY CHARLES L. SCUDDER, M.D.,

OF BOSTON, MASS.

Surgeon to the Massachusetts General Hospital.

THE accompanying drawings have been made for me from studies of the anatomical findings at operations for hernia during the past few months. These drawings illustrate my interpretation of the essential details of Bassini's operation for inguinal hernia.

In all ordinary cases of inguinal hernia, I have found this method of exposure and suture of the hernial sac and the method here described of repair of the abdominal wall satisfactory. I have never yet found it necessary or advisable to excise the veins of the cord. I have occasionally in children not transplanted the cord, and under certain conditions have not transplanted it in adults. It seems to me of comparatively little importance whether the cord is or is not transplanted. I am more and more inclined not to transplant it. I have utilized the fascia of the rectus abdominis a few times to reinforce the abdominal wall above the inner end of Poupart's ligament, as illustrated by Halstead. The elaborate method of suture used by Halstead seems to me, excepting in unusual cases, unnecessary. The simple suture described here is efficient in all ordinary cases of inguinal hernia.

The patient is in bed two weeks, on a bed-rest the third week, and out of bed the fourth week. A bandage is worn for one month, after being up and about, for the comfort it affords. The operation is as follows:

An oblique incision is made sufficient in length to expose readily the situation of the internal and the external abdominal rings. The few bleeding vessels are clamped and immediately ligated. The external abdominal ring is exactly developed by a few strokes of the knife and blunt dissection. (Fig. 1.)

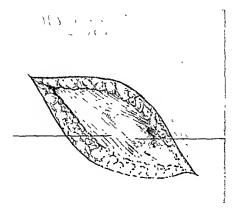


Fig. 1—Oblique measion through skin and superficial fascia down to the fascia of the external oblique muscle. Note the external abdominal ring made apparent by slight bulging caused by full hernal sae.

C L Scudder

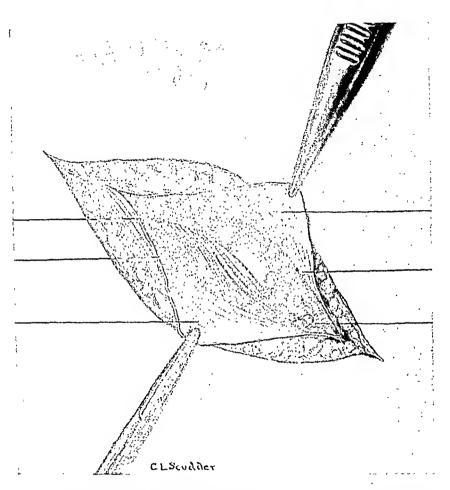


Fig. 2.—Oblique incision in line of fibres of the external oblique fascia. External oblique fascia freed from parts beneath. Note fibres above of internal oblique, conjoined tendon, below well-developed cremasteric fibres, bulging sac of hernia, cord showing at inner angle of wound.

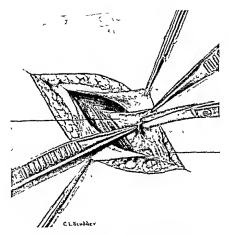


Fig. 3—The sac of the herma has been isolated sufficiently and raised by forceps. Note scissors opening the sac cord in lower angle of wound

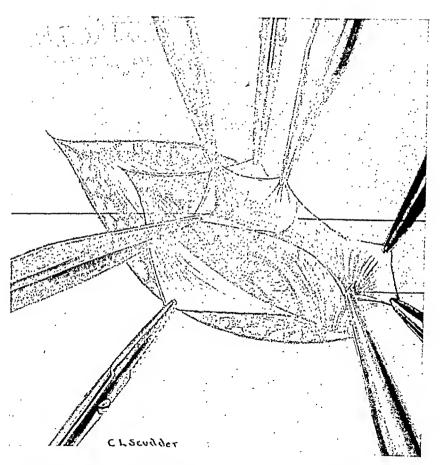


Fig. 4.—The sac of the hernia has been opened. Note the interior of the sac leading towards peritoneal cavity above and to the scrotum below. Note the cord posteriorly to the sac and the dotted line across the sac indicating the line of section for further isolation of the peritoneum.

The external oblique fascia is divided parallel with its fibres and freed by blunt gauze dissection from the parts beneath for about two fingers' breadths from the cut edges. The lower border of the internal oblique muscle, the sac of the hernia, the cord covered in part by the cremaster muscle and fascia are thus exposed to view. (Fig. 2.) The cremaster muscle may be well developed, as is indicated in the drawing, or it may be poorly developed and appear as a thin fascia with a few muscular fibres scattered through it. When the muscle is well developed, it may be utilized in closing the abdominal wound, as is here illustrated.

The cremaster is split parallel to its fibres and separated from off the sac and cord, and the sac developed by blunt dissection with fingers and gauze. The sac is thus more clearly exposed to view. The sac is held by dissecting forceps and opened by knife or scissors. (Fig. 3.) The sac is emptied of its contents. This step is facilitated by the Trendelenburg position, complete anæsthesia of the patient, and a gauze sponge thrust into the sac and cautiously withdrawn. If any intra-abdominal organ (intestine, omentum) is found adherent to the interior of the hermal sac, it should be carefully freed and all bleeding checked.

The sac is divided transversely down to the cord and its vessels. The line of posterior division of the sac over the cord is indicated in Fig. 4. After dividing the pentoneum, the separation of cord from sac is very greatly facilitated by blunt sponge dissection. The proximal part of the sac is isolated (a) from the cord and (b) from the abdominal muscles (the internal oblique, conjoined tendon) in order to facilitate the placing of the peritoneal suture. It is important to make the isolation of the neck of the sac complete in its whole circum ference, so that the subsequent suture will be an effectively placed one.

The commonly used purse string suture, even if applied with transfixion of the neck of the sac, may slip. This occurred to me some years ago. It fortunately happened before the outer wound was closed, so that a secure suture was immediately

placed. Since that time I have used the suture illustrated in Fig. 6. When the sac is very thin walled, a purse-string suture securely applied will serve every purpose. The distal portion of the sac (the scrotal part), if such exists (Fig. 5), I have ordinarily disregarded, except to curette gently or to wipe over its inner surface with gauze. It is unnecessary to remove it in most cases. If it is thick and extensive, it is well to excise it. If it is left *in situ*, no suture is taken in its mouth. The cavity of this sac is probably completely obliterated. I have never seen a hydrocele or cyst follow this method of treating the undissected distal portion of the hernial sac.

Traction downward upon the proximal portion of the hernial sac and retraction of the tissues (internal oblique, cremaster, etc.) at the upper angle of the wound, together with traction downward upon the cord, facilitate suturing the peritoneum (Fig. 6). I have used the continuous loop or hemstitching suture taken with chromic gut and a curved needle. (Fig. 6.)

The cord and distal portion of the sac are now lifted by blunt dissection from their bed, if it is decided to transplant the cord, and are together held aloft by retractors. (Fig. 7.)

The next sutures are placed as indicated in Fig. 7. It is well to avoid including within the suture the nerve in the lower border of the internal oblique. I always place one or two sutures external to the spot where the cord comes through the peritoneum (Fig. 7) and superficial to the suture of the neck of the sac. These two sutures preclude the possibility of a recurrence of the hernia at this particular place. The remaining sutures are placed so as to lie beneath the uplifted cord. These interrupted sutures include the lower border of the internal oblique and conjoined tendon, the cremaster muscle and fascia, and Poupart's ligament. (Fig. 7.) The sutures are tied securely without constricting the muscular tissues. (Fig. 8.)

The cord is placed upon the tissues approximated by this series of sutures, and the external oblique fascia is closed over the cord by a continuous chromic catgut suture, taken as illustrated in the drawing (Fig. 9), with a loop or hemstitch. The

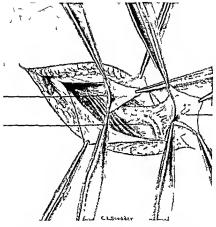


Fig. 5. The per toncal post on of the tern all sac has been completely solated. I ke se the serotal post on. Tract on towards the symphons so pub a upon the peritonical upper part of it esac fac tates proper place gof the satures.

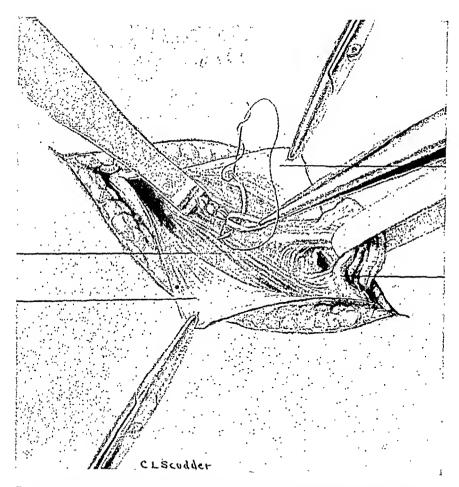


Fig. 6.—The suture is being taken through and across the neck of the sac. Note retractor keeping internal ring region well in view. Note lifting of cord by gauze-tape.

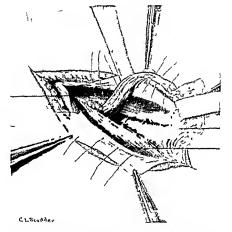


Fig. 7—Cord well raised with all cord structures from figural canal. Note suture 1 aced beneath cord passing through con 6 ned teodom cremater and Poupart's 1 gament Note separation of finner part of d y ded fascas of external oblique.

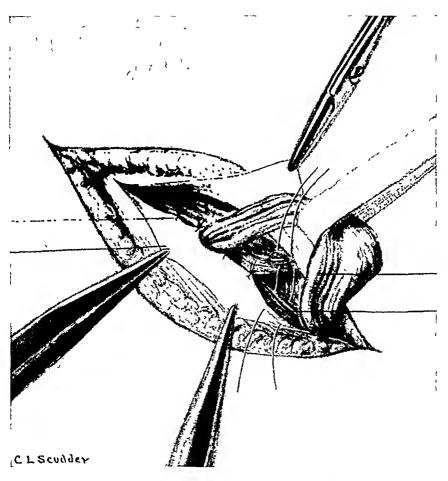


Fig. 8 -Sutures above and below the cord tied excepting two.



Fig 9-Splace of the external oblique fascia above the cord

	•		

fascia is thus not only approximated, but there is a definite overlapping or coaptation of the two layers of fascia as by the mattress suture. Mayo has called attention to the security of the mattress suture taken transversely in umbilical hernia, and Halstead to the firmness of a wound closed by the mattress suture in cases of inguinal hernia.

The superficial fascize are next approximated, and with them the subcutaneous fat tissue, by interrupted or continuous fine chromic catgut sutures. The skin is closed by silkworm gut, either cutaneously or subcutaneously placed. All blood and moisture are carefully wiped from the suture creases and skin. A dry sterile gauze dressing fastened with collodion is applied.

I think no especial dressing of a wound of the kind described above has any advantages over the simple dry sterile gauze. I have used, and have seen used, silver foil, ontiments, pastes, and powders. I have seen no advantages over the dry gauze dressing. I think that the two factors, other things being equal, which assist or favor the healing of a hernial wound are absolute hamostasis and a minimum of trauma (by traction), to the skin edges of the wound. Trauma to the skin may be avoided by an ample cutaneous incision.

So important is absolute hæmostasis, that I not only ligate every tiny bleeding point in the wound, but I apply a ham splint to the leg of the operated side, that the spica bandage applied to hold the dressing may exert a maximium of pressure upon the wound during the first twelve or twenty-four hours. The splint is then removed. There is no pressure exerted upon the region of the groin by a spica bandage if the patient is permitted to flex the knee of the bandaged side. A broad band of adhesive plaster is used by some operators to secure the dressing and maintain pressure. Adhesive plaster is dirty, dis agreeable and ordinarily ineffective.

In enumerating the facts which seem to me important in the operation for the cure of an inguinal herma, I would include the following An ample cutaneous incision, absolute

hæmostasis: an anatomical dissection of the parts concerned. so that every structure is clearly recognized: the complete isolation of the neck or abdominal portion of the sac; the complete emptying of the sac of both adherent and non-adherent contents: the suture of the hernial sac at the level of the peritoneum of the anterior abdominal wall: the exact suture of the abdominal wall superficial to the peritoneal sutures, including always one or two sutures placed over and above the sutured sac: the minimum of trauma to the cord. I have had a slight recurrence on one side in the case of a very stout "baggageman" who had a double inguinal hernia. The recurrence was on one side only. In this case I tied the sac's neck with a pursestring suture, and I included within the purse-string extraperitoneal fat tissue. As this fat tissue atrophied from pressure of the ligature, the ligature became loosened, and it is to this fact that I attributed the recurrence. About two years after the operation for the recurrence, there had been no further difficulty with the hernia. This man was killed in a railroad accident. I found at autopsy upon examination of the hernial wounds that the abdominal wall was intact.

LUYS'S INSTRUMENT FOR THE INTRAVESICAL SEPARATION OF THE TWO URINES.

BY FRANK P VALE, M D, of Washington, B. C.

From the earliest times the urine has been studied with increasing success as an index of disease, but it is only in the last twenty-five years, since the development of renal surgery, that the necessity for an examination of the separate urine from each kidney has arisen, as an aid to a more exact diagnosis, and more accurate appreciation of the functional capacity of each organ. The older methods of meeting this requirement are of interest, and aid in a better understanding of our subject.

Tuchmann, a German physician practising in London in 1874, was apparently the first to emphasize the value of thus separating the urines and the insufficiency of the methods there tofore in vogue in differentiating various surgical affections of the kidney, for example, he said, in determining the source of a hæmaturia or a pyuria, or distinguishing between kidney colic and impaction of a stone. He employed a modified lithotrite with a short right angled beak, between the blades of which he compressed one ureteral orifice, the bladder urine collected during the time of compression representing the secretion of the opposite kidney In its use he was guided to the mouth of the ureter by the smooth surface of the trigone, which could not be pinched up, and by the figamentum interpretericum, which he had found, after a study of the bladder in fifty cadavers, was so prominent as to be felt like a cord when the instrument passed over it, even imparting to the hand a slight vibration In his first paper he reported the use of the instrument in eight

¹Read before the Medical Society of the District of Columbia October 19 1904

patients, mostly males, and also experiments with it on himself 1

Gustav Simon a few months later criticised this method of Tuchmann, and demonstrated it was quite possible to directly catheterize the ureters. This he had accomplished seventeen times on fifteen patients, and was convinced the procedure was easy in the majority. He dilated the urethra under chloroform narcosis, introduced the index-finger, and was guided to the ureteral orifices, which themselves cannot be felt. by the interureteric ligament and the lateral elevations formed by the muscle fasciculi of the ureters which are prolonged towards the bladder, which he said he could readily recognize. Later, Simon took as a guide the orifice of the uterus, which was readily distinguishable through the vesical wall, the mouth of the ureter being found three-fourths to one centimetre outside the commissure of the lips of the cervix and one-fourth of a centimetre in front of it.2 He objected to the method of Tuchmann, first. because of the difficult orientation of the bladder at the end of such a long instrument, and, second, because of the short time the ureter could be compressed. His clinic in Heidelberg was visited by Tuchmann, and each demonstrated to the other his method.

Thus in the very beginning of urinary separation a discussion was precipitated as to the relative value of direct ureteral catheterization and indirect intravesical separation. The difficulty of the former was the first objection urged against it. It was out of the question, except in females. Winkle found it impossible either on the living or cadaver. Tuchmann objected to it because chloroform narcosis was necessary, and he regarded the separation as incomplete on account of the flow of urine alongside the catheter and into the bladder, if the bladder urine was accepted as the secretion of the other kidney.

Following Tuchmann and Simon, the subject was taken up the next year by Grünfeld.⁴ One of his assistants, Stein, had employed two years before the endoscopic tubes of Desormeaux in examining the bladder in both males and females.⁵ Grünfeld was the first to catheterize the ureters by the aid of

vision. He filled the bladder with water and employed straight, short, endoscopic tubes with a glass window at the distal extremity, the source of light being outside the bladder. He described minutely at what angle to turn the endoscope with reference to the median line of the subject and the depth to which it was to be pushed into the bladder to find the ureteral orifices, thus anticipating Kelly nearly twenty years

Pawlik improved the method of Simon by introducing

Pawlik mproved the method of Simon by introducing the metal ureteral catheter through the undlated urethra. With the woman in the knee chest position and posterior vaginal wall retracted, the position of the catheter could be noted through the anterior vaginal wall, and was guided to the ureteral or fices by the prominence, there to be noted, of the interureteric ligament and the cord like elevation of the ureters. He had thus sounded thirteen patients at the time of his first paper. It is natural," he writes, 'that in an opening so small one does not succeed at once, ordinarily, however, one succeeds quite rapidly." Later, he catheterized simply by means of the finger in the vagina to guide the catheter.

Warnots ⁷ seems to have been the only other surgeon to succeed with the method of Pawlik. His efforts on the cadaver in imitating Simon were so discouraging he did not attempt it on the living Following Pawlik, however, he was more successful, and in each of two women catheterized one ureter in about twenty minutes

The work of Newmann seems to have been generally over looked, probably because it is buried in a thesis on malpositions of the kidney submitted to the University of Glasgow in 1883 for the degree of M D* He dilated the bladder in the female with eight ounces of boracic acid solution, and took a step in advance of Grünfeld by introducing into the bladder a small electric light, on a long stem. The ureteral catheter was next introduced, and then a cone shaped speculum with a glass end He evidently used this method successfully in his practice.

Recognizing the difficulties of ureteral catheterization, which was confined to the hands of a very few, and even with them limited in use to the female, Silbermann 9 reverted to the

method of Tuchmann, and devised a very clever instrument for compressing the ureteral orifice, which, however, like its prototype, was seemingly never used except by its originator. His idea was to imitate nature and close the ureteral orifice as by an artificial tumor, having had a patient with a fibroid tumor of the bladder set squarely in front of one ureteral orifice. To this end he concealed in a No. 18 (Charrière) catheter a small rubber balloon, which was made to protrude, when within the bladder, by filling with mercury, the weight of which compressed the ureteral orifice when directed over it. He had used the instrument twenty-seven times in fifteen patients, but could not attest the accuracy of the separation because none of the patients suffered from a unilateral affection of the kidneys.

Thus far efforts at catheterization of the ureters had been confined to the female. In anticipation of a case in the male which might imperatively demand catheterization, Harrison ¹⁰ in 1884 investigated its possibility, on the cadaver, through the lateral lithotomy incision, but found it necessary in addition, in order to bring the ureteral orifices into view, to open the abdomen in the median line and make pressure on the fundus of the bladder.

With the mention of Hurry Fenwick's "Urinary Aspirator," ¹¹ I have about completed an enumeration of the earlier steps which have led up to our present methods in separating the two urines. "The aspirator consisted of an elastic ball and an oval glass bottle, which could be affixed to the end of a specially curved catheter, which latter was furnished with an elongated laterally placed eye. Later, the catheter was double channelled so that the urine from the disengaged ureter might enter and drain into a different receptacle." Apparently only very small quantities were thus secured, for the urine rarely ran into the bottle, but had to be collected from the catheter channel.

A reflection in the United States of these efforts in Europe at separation of the two urines is found in a discussion before the New York Practitioners' Society in 1883.¹² In the report of a case of hip-joint amputation with the aid of a Davy's level

to control hæmorrhage, Weir called attention to the fact that the ureters were within the area pressed upon by the lever, and suggested it might be used "to determine the comparative condition of the two kidneys," in place of the hand which Sands had employed in at least one case. In the discussion, Polk described a double curved eatheter he had devised and used on the cadaver to compress the ureter through the bladder against the pelvic wall

How successfully ureteral catheterization was taken up in this country in 1892 by Kelly is familiar to all. But this method of separating the urines was not equally applicable in the male until the perfection of the catheterizing cystoscope by Albarran in 1897, ¹³ since which time intravesical separation has been all but abandoned

It is the object of this paper to call attention to a new intravesical separator, which again brings this method into prom mence, and which is certainly destined to fill an important place in our armamentarium. My prophecy for it is not as sanguine as that of its originator, it cannot supersede ureteral catheterization in all cases, but it will surely be a valuable adjunct to that method,-one supplementing the other, each having its own field of usefulness Further, it will make urinary separation possible in the hands of many who have not the time or inclination to learn ureteral catheterization. Luys's instrument is now widely used in France, and more recently in Germany, but as yet is scarcely known in the United States, only a few cursory references having been made to it. In England it has been discussed by Bickersteth 14 Before describing it, it is necessary to briefly refer to three instruments which imme diately preceded it, and which constituted a new departure in urmary separation not yet referred to

It was Lambotte, in 1890 15 who described the first instrument for partitioning the bladder. This consisted of a double sound provided at its distal extremity with two straight, parallel steel springs covered by a small rubber balloon. The springs when relaxed extended themselves and formed a continuation of the shaft of the catheter (Fig. 1), but when traction was made at the proximal end of the instrument on a rod

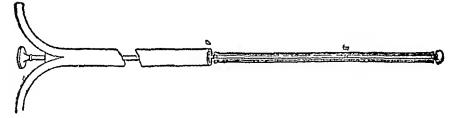


FIG. 1.-After Lambotte. Closed.

running between the springs, they outlined a circle or an ellipse according to the amount of traction, and with the rubber made taut, formed a vertical partition in the bladder (Fig. 2); when the springs were released they again became extended, and did not interfere with its removal. Lambotte seems to have employed the instrument with some success in both the male and female, and occasional reference is made to it by others; ¹⁶ but apparently it was unknown to Neumann, who seven years later

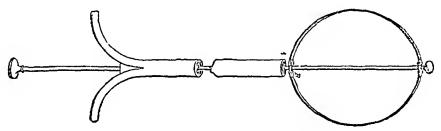


Fig. 2.--After Lambotte. Opened.

briefly described the second instrument for partitioning the bladder, this one only applicable in the female, however.¹⁷

Neumann's instrument (Fig. 3) consisted of a double catheter, provided with a median ridge which formed the septum between the ureteral orifices when pressed against the base of the bladder, supported by a finger in the vagina. This instrument attracted considerable attention. Kelly ¹⁸ said that at first it looked as if it would limit the use of the ureteral catheter.

A year later, Harns ¹⁰ described his urinary segregator, which is still used successfully by many, and is now so well known as to hardly need description. The principle involved was a new one and entirely original with him. By means of a lever introduced into the vagina, or into the rectum in the male, and pressed up against the base of the bladder, a sort of watershed was raised between the ureteral orifices, each side

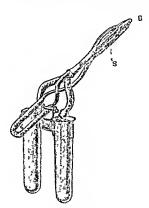


Fig 3-After Neumann

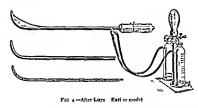
being drained by an ingenious double catheter. This instrument I have used from time to time since its introduction, but never with a feeling of absolute security as to the results obaimed. The lever and aspirating bulb complicated the instrument considerably. Downs's modification aimed at the elimmation of the latter objection, and was successfully used in Germany by Freudenberg and in France by Nicolich and others.

In France, the Harris instrument was first employed by Hartmann at the Lariboisière Hospital, Paris; 20 but it did not prove satisfactory in his hands. Early in 1901, his assistant, Luys, showed him a new instrument the latter had devised for intravesical separation of the two urines, and from the first trials of it, which were made in his clinic, its superiority to the Harris instrument was apparent, and, slightly modified, has "In all," Hartmann says, been in constant use there since. "over 400 applications of the instrument have been made in 210 males and females, without accidents and with perfect results, establishing in an irrefutable manner the accuracy of the method; the question being settled for all those who have seen it used, and further discussion impossible. Its simplicity and facility of manipulation, which puts it at the door of all practitioners, explains how, in a short time, intravesical separation of the urines, until this moment almost abandoned, has made, so to speak, the tour of the world. Very rapidly it has been accepted, and has taken the place of catheterization of the ureters, which until now has reigned supreme in Paris. The Necker Clinic, where ureteral catheterization originated, and where it was vulgarized, seems actually to abandon it, as the successive publications of Cathlin and Legue indicate."

Luys states ²¹ he began to study the subject immediately after the termination of his "Internat" in 1890. In the course of his dissections, he was struck by the fact, so simple and so well known, that when one has the opened bladder before him, and places the extended finger between the ureteral orifices, one can depress the base of the bladder, and thus create two pockets, entirely distinct, in which will collect the separate secretion from each kidney. It was manifest that, to obtain a good intravesical separation of the urines, it was not necessary to partition the upper part of the bladder, but only necessary to thus depress its base to prevent all mixing of the two urines, if one insured the drainage of each pocket to prevent too great an accumulation of urine in them. He therefore simply substituted for his

finger an instrument which could be readily introduced through the urethra, intended to thus depress the base of the bladder, and provided with a median partition to be extended at will

The essential principle, then, to which he directed his efforts, was the elevation of a water-tight septum in the small triangle lying between the ureteral orifices and that of the ure thra, in such a manner as to collect on each side the secretion from the corresponding kidney, and providing free drainage for each side so as to prevent accumulation of urine within the bladder. He points out that the three elements of the trigone, i.e., the urethral and right and left ureteral orifices, have a fixed relation to each other, quite independent of the dimensions of



the bladder itself The distance between the ureteral orifices varies always between twenty and thirty millimetres, while that from the apex of the triangle (the urethral orifice) to the base of the triangle (a line connecting the two ureteral orifices) is equally constant, between twenty five and thirty millimetres

To these fixed relations he adapted his instrument of fixed and uniform dimensions. It consisted of three parts,—two re movable hollow metallic sounds of the ordinary Guyon curve, flattened on their inner surfaces to accommodate between them the third piece, a flattened metallic stem of the same curve (Fig. 4). This intermediate piece carries the handle of the instrument, and, projecting a little beyond the convex surfaces of the two laterally placed hollow sounds, forms the metallic

septum when pressed against the base of the bladder; in its concavity lies a small chain, like that of an écraseur, which forms a chord to the arc of the extremity of the instrument when made taut by a screw in its handle. A gutta-percha "chemise" covers this intermediate part like a finger-stall, and when raised by tightening the chain forms a rubber septum in the bladder three centimetres high, above which the urines cannot mix, as constantly drained from each side by the hollow metallic sounds. When slackened, the resiliency of the rubber "chemise" carries the chain back into place in the concavity of the curve of the metal stem. The two hollow metallic sounds fit into the handle on each side of the stem, and are attached to the latter at its distal extremity by a small screw cap; the instrument thus assembled has a circumference of about twentyfour millimetres. The openings in the lateral catheter channels for draining the urine from each side of the septum are on the inner and upper surfaces, to avoid their occlusion by the mucous membrane of the bladder.

The simple Guyon curve of the original instrument (Fig. 4) exposed it to three objections. Considerable pain was often caused by dilating the neck of the bladder in extending the rubber septum, if the entire chain and arc subtended by it were not within the bladder, or if the full introduction was prevented by an anteroposterior diameter of the bladder of less than seven centimetres. Second, there existed sometimes, below the convex surface of the metallic septum, a small retroprostatic culde-sac (Fig. 5), permitting a partial admixture of the urines, to avoid which it was necessary to lift that part of the bladder wall against the instrument with the finger in the rectum. And, third, by reason of the elevated position of the handle of the instrument, an aspirating bulb was necessary. (Fig. 5.)

The subject of the best catheter curve for drainage of the bladder, especially in cases of prostatic hypertrophy, had recently been studied in France by Escat.²² By adopting what is known as the Escat curve (Fig. 6), all three of the above difficulties incident to the simple Guyon curve were at once overcome.

Later, Luys had constructed a smaller model, No 15, to be used on children, and, at the invitation of Albarran, success-

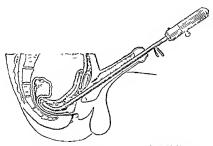


Fig. 5-After Luys Showing retroprostatic cul-de-sac with earlier model of instrument

fully separated the urines in the case of a little girl of six and a half years, in which this skilful operator was unable to catheterize the ureters.—on the left side because the ureteral orifice



Fig. 6 -After Luvs Later model assembled

could not be found, and on the right side because of numerous fungosities arising within the ureter and encircling the onfice 23 The character of the urine obtained by the separator from the

left side pointed to disease of that kidney, which was corroborated a few days later by nephrectomy performed by Albarran.

As the instrument has a fixed curve, it is necessary to adapt the posterior wall of the bladder to it by bringing the patient into a sitting position after its introduction. Luys has found on the cadaver, as long as this position is maintained, the septum is perfectly stanch. If the patient had to be anæsthetized, a necessity hardly liable to arise, the upright position might constitute an objection to the use of the instrument. Luys mentions one case, with a very painful secondary tubercular cystitis, in which a few whiffs of chloroform were required. At first sight this unusual curve for a urethral instrument suggests difficulty and pain in its introduction; and, indeed, these

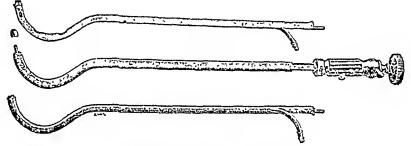


Fig. 7.-After Luys. Later model, showing parts.

are the chief objections raised against the instrument. If one attempts to remove it from the bladder with the same upward motion of the handle appropriate with the simple Guyon curve, this can only be accomplished by brute force, which will be most painful. The handle must be first depressed and then elevated, and if any difficulty is experienced, a slight elevation of the pelvis with a support under the buttocks will give room for still greater depression of the handle. The same movement of alternate depression and elevation of the handle also secures the introduction of the instrument without pain. In its present form with the Escat curve, the development of the rubber septum is absolutely painless, once the instrument is within the bladder, and if properly maintained in position is not more

than uncomfortable, as apprehensive patients have informed me. I have several times permitted it to remain an hour in place, though sufficient urne is usually obtained in twenty or thirty minutes.

The handle is very slightly raised, and forward traction made so as to apply the convexity of the instrument snugly against the base of the bladder. Luys says that if one is careful to combine gently these two movements, i.e., slight traction and then elevation of the handle, one can be certain the septum is

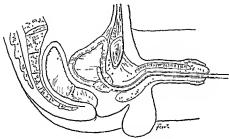


FIG 8-After Luys Instrument partially introduced

perfect and that the urines do not mix. No force is used; it simply being necessary to bring the elasticity of the tissues into play and feel slightly the resistance of the neck of the bladder and its base. If the handle is too vigorously elevated, the patient complains a great deal. A rectal examination will assure the operator the instrument is accurately placed, and the patient is instructed how to so keep it; it is inadvisable to use the support, as Luys himself states, because the patient may accidentally move and change his position with reference to the instrument, and thus jeopardize the separation.

Before introducing the instrument, the bladder is first thoroughly washed out, forty or fifty cubic centimetres of boracic acid solution being allowed to remain to start the siphon. If the patient secretes less than a litre of urine a day, Luys suggests a diuretic or a copious drink of water a quarter of an hour before the separation. The lower bowel should be empty and a previous examination demonstrate no obstruction exists in the urethra.

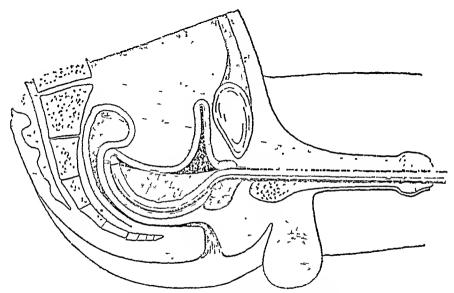
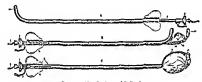


Fig. 9 -After Luys. Instrument fully introduced.

The accuracy of the separation, if the instrument is properly used, in suitable patients cannot be questioned in view of over 200 case histories reported by Luys, which include nephrectomized patients with not a drop of urine flowing from the catheter corresponding to the side operated upon, and patients with a hæmaturia or pyuria with absolutely clear urine on the sound side.

There is another instrument for the intravesical separation of the urines much used in France, devised by one of Guyon's assistants at the Necker Hospital, Cathlin, whose name was already well known as the author of the epidural route for

spinal injections. The central idea in this instrument seems to have been to overcome the fixed dimensions of Luys's instrument and adapt it to the varying capacity of different bladders. This he accomplished in a very clever mainer by means of a thin pear shaped rubber septum attached to and supported at its periphery by a thin ribbon of watch spring steel. The septum is concealed in the shaft of the instrument and pushed out into the bladder to a distance as indicated by a scale on the shaft, corresponding to the previously determined capacity of the bladder. The one great advantage of the instrument is in bladders of very small capacity, Legue 24 reports a successful application in which the bladder would only hold eighteen cubic centimetres.



Fic to -After Rochet and Pallends

But this feature is outweighed by several objections,—greater cost, larger caliber (No 28), smaller catheter channels, and an increased liability therefore to their occlusion, but more than all, an uncertainty as to the stanchness of the septum, which is jeopardized if the membrane is developed too far or not far enough when a fold of the rubber tissue of the diaphragm, and not the metallic periphery, is applied to the blad der wall. In a bladder which contracted strongly, the delicate membrane would be doubled up, or, if the bladder wall is relaxed, as in chloroform narcosis, the instrument cannot be employed, as Cathlin himself states ²⁵. The success of the separation is consequently subordinate to the contractility of the bladder, which, as Luys points out, it is absolutely impossible to

regulate, and further urges against the instrument that the idea of vesical graduation is entirely foreign to the principle of intravesical separation of the urines. The Cathlin instrument has been used in this country by Keen and Valentine. It might be successful in the presence of a fibroid uterus or carcinoma of the cervix in which the depression of the base of the bladder necessary for the Luys instrument could not be obtained.

In the rare cases of vesical fistulæ where the bladder could not be distended with either air or water, a new instrument (Fig. 10), described by Rochet and Pallenda,²⁶ for compressing the ureteral orifice, and almost identical in principle with the instrument of Silbermann, may find a field of usefulness.

Before indicating wherein intravesical separation is to be preferred to ureteral catheterization, let us consider briefly what legitimate objections can be entertained against this latter procedure, for theoretically one acknowledges it is the ideal method of urinary separation.

First, its difficulty is urged by a large number who either have not the time or inclination to acquire the necessary ability; but for those who use the cystoscope this objection does not hold in the majority of cases, though in the hands of the most expert in some cases ureteral catheterization is impossible. To those whose first efforts have been made with the indirect lens system, as were my own, the comparative facility of the operation with the direct cystoscope, which has been perfected in this country by Tilden Brown, will come as an agreeable surprise.

A second and serious objection is our knowledge that there is a danger which, though small, actually exists. Two or three deaths at least have been reported from simple exploratory catheterization, as that cited by Tuffier.²⁷ Sampson, the Resident Gynæcologist at Johns Hopkins Hospital, recently had a death from an ascending ureteral infection as the result of employing the catheter as a guide to the ureter during a hysterectomy for cancer of the uterus. Isräel ²⁸ reported the case of a physician with an old urethritis and a slight cystitis. One ureter was catheterized by Casper because of lumbar pain on that side; the urine collected through the ureteral catheter was clear, and the

patient rejoiced that his kidney was normal. That night he was seized with lumbar pains, chills, fever, vointing, and later passed a cloudy urine containing bus. This condition still per sisted at the end of three years, with fever and pyuria. Hartmann 20 points out that a slight pyonephritis set up by the ure teral catheter would not attract immediate attention, but would require a certain time to develop, and perhaps not be traced to its true cause. Krotoszyne 30 says that Nitze, in a personal conversation, stated that in his opinion catheterization of the ure ters had done a great deal of harm because performed without strict indications. Nearly all operators regard a severely in fected bladder as a dangerous circumstance in the use of the ureteral sound, in the presence of a tubercular kidney, the catheterization of the supposedly normal side is absolutely impermissible.

Albarran, ⁸¹ however, regards ureteral catheterization as entirely innocuous, and in support of this contention eites the 1000 cases of Casper, a like number of his own, the hundreds of Nitze, those of Pasteau, more than 500, of Kolischer, more than 500, Bierhof, 475 and many others. The dangers are probably overrated by the majority of antagonists of ureteral catheterization, but they are great enough to demand most care full attention to asepsis, and a regard for legitimate contraindications.

A third difficulty is encountered, if but one ureter is cath eterized, and it is not entirely occluded by the sound, a part or all of the bladder urine, which is regarded as the secretion from the uncatheterized kidney, may come from the catheterized side by reason of the urine on that side trickling between the wall of the ureter and the catheter Albarran has endeavored to overcome this with a specially devised catheter with open end and a slight swelling immediately behind. This source of error is, of course, entirely avoided by simultaneous catheteriza tion of both ureters.

The following points of superiority, then, can be advanced for the Luys instrument—its simplicity and freedom from all danger reduces urinary separation from the dignity of an oper-

ation to a procedure, and gives it a certain medical interest; in fact, last year a Paris Thesis ³² was devoted to the medical aspects of the subject; tuberculosis of one kidney or an infected bladder do not constitute contraindications to urinary separation with this instrument. In children, in prostatics, and in patients with a reduced bladder capacity, it is successful where catheterization may be impossible. Among Luys's cases of prostatic hypertrophy, however, I find one in which the separation could not be effected, because the use of any instrument caused bleeding in passing the prostate and the blood-clots plugged the mouths of the catheters.

The following advantages of ureteral catheterization over intravesical separation are urged by Albarran:

First. Absence of bladder contamination. This I admit as far as bacterial contamination is concerned; but as to histological elements, if the bladder is first thoroughly washed out, even in a severe cystitis the small area over which the urine flows could not furnish enough pus to give rise to an erroneous interpretation, a point always made by Harris with regard to his instrument; in the presence of a hæmaturia, an examination of the bladder would naturally first be made.

Second. Greater security as to actual separation would seem to be absolutely refuted by Luys's 210 cases. The only possible error with the Luys instrument, properly used in suitable cases, comes from an atypical implantation of the ureteral orifices. The authors who have devoted themselves to a study of anomalies of the trigone are very few; but it is well known that such anomalies are very rare. If the examination furnishes two identical urines, this would necessitate a cystoscopic examination to demonstrate whether the ureteral orifices were normally placed; usually, however, the accuracy of the separation is attested by at least slight differences in the specimens. In the very rare cases in which there is a double ureter on one or both sides, the Luys instrument might give more reliable information than catheterization.

Third. Simultaneous cystoscopy is an undeniable advantage, but only in a first examination.

Fourth Simultaneous exploration of the ureter is also an undemable advantage, but only at the first examination. Luys describes a method of Berger, which he has made use of a number of times successfully in dilatation of the pelvis, intermittent retentions kinking of the ureter due to displaced kidney, etc., the maneuvire consists simply of elevating slightly the diseased kidney towards the diaphragin, which will empty the pelvis of its tell-tale contents, when otherwise little or no urine would be secured from that side

Fifth If the contention of Albarran that a correct estimate of the functional capacity of the kidneys can only be arrived at by a study of the separated urines collected during at least four to six hours, or better twenty four hours, proved to be true, the usefulness of Luys's instrument would be greatly re stricted, for the ureteral catheter has been allowed to remain us situ twenty-four hours, anything approaching which would be impossible with Luys's instrument. But Albarran is alone in this contention, others, including Casper, maintaining that a better conception of the functional capacity of the kidneys is obtained by several examinations on successive days, or fifteen to twenty minutes' duration

Albarran's fifth and final claim is that the catheterizing cystoscope is easier to introduce than the Luys instrument

It is now apparent that each of these two methods of separation has a field of usefulness of its own, one supplementing the other. There are certain well defined indications for the interest cathleter, but in a large majority of cases the instrument of Luys will be found sufficient 'to permit a rigorously precise diagnosis of the functional state of the kidneys and lay down the indications for operation" (Hartmann). The interest sound will be used in locating stone and stricture, and in connection with the X-rays, after the suggestion of Illyès, 38 to outline the ureter and locate the kidney, to collect urine for bacteriological examination, to exclude the ureter as the source of pus or blood, and of course for therapeutic purposes.

Separation of the two urmes has extended far beyond its

original indications. It is demanded in all cases of hæmaturia; in the early diagnosis of renal tuberculosis; in all obscure abdominal tumors as an aid in differentiating between involvement of the kidney and surrounding organs. In view of the work of Edebohls and his followers in decapsulating the kidneys, urinary separation should be resorted to early in all cases of nephritis. Edebohls 34 in 1901 reported eight instances of unilateral nephritis among nineteen cases of chronic Bright's disease on which he had operated, and recently added three more out of a total of seventy-two cases. "This feature of my work," he says, "evoked, perhaps, more comment than any other, and met dissent and incredulity in not a few quarters." The further necessity of urinary separation as a preliminary to all operations on the kidneys is shown by the statistics of v. Schmieden; 35 in a series of 1118 nephrectomies he found that of 301 deaths following the operation, fifty-six times it was due to anuria, or uræmia, in consequence of disease, or entire absence, of the other kidney.

The present lowered mortality in kidney surgery is for the most part due to a preliminary study of the separated urines. While the efforts of the last few years towards an exact appreciation of the functional capacity of each kidney have been unsuccessful, a comparison of the two urines, as to freezing-point, phloridzin elimination, chemical and microscopical characteristics gives us an approximate idea, and at the same time most valuable surgical indications. A consideration of this aspect of urinary separation, however, would lead us beyond the limits of this paper.

In conclusion, I will briefly detail several case histories illustrative of the use and accuracy of Luys's instrument:

Case I.—Mr. S. came to me complaining of rheumatic pains in arms, legs, and especially in the back, which latter were exaggerated by the muscular exertion of stooping, for instance, just as in an ordinary lumbago. A rather large amount of amorphous urates from a freshly passed and centrifugalized specimen of bladder urine, containing also a few granular casts, many pus-cells but no albumen, immediately directed attention to his kidneys.

101

The next day I separated the urmes with Luy's instrument, believing, however, that I was dealing with a medical affection of the kidneys

Instrument permitted to remain fifty-five minutes Preliminary injection of five milligrammes of phloridzin half-hour before

	Right	LEFT	BLADDER
Amount. Color	28 cubic centimetres. Cloudy and very high colored.	t2 cubic cenumetres Clear and straw colored	Cloudy
Amount of deposit with centrifuge	2 cubic centimetre composed mainly of amorphous urates, few pus' cells.	• • • • • • • • • • • • • • • • • • • •	2 cubic centimetre, composed of amor phous urates and many pus cells.
Phloridzins Ures.	Phloridain negative. 12 grammes per litre.	Negative Same	14 grammes per litre

The large deposit of amorphous urates on one side only, from freshly passed urine, suggested a renal calculus. Next day took two radiographs, both showed a stone in pelvis of the right kidney.

ČASE II—Mrs R Husband brought specimen of wife's urine for examination, she had been sick several months, and nature of illness had not been determined by her physicians in the neighboring village where they lived Urine contained a large amount of pus but no kidney elements Centrifugalized a large amount of urine and stained the pus for tubercle bacilli with positive results. I gave the husband an unqualified diagnosis of a tubercular lesion some place in the genito-urinary tract. A week later I was requested to see patient for the purpose of determing, if possible, the exact seat of the trouble. I found the right side of the abdomen in the kidney region very sensitive, and the muscles so rigid I could not palpate the kidney, but on percussion it was casy to make out what was apparently that organ, very much enlarged. Cystoscopic examination showed the seat of the trouble was not in the bladder. I separated the urines with Luys's instrument.

•	Right.	Left.
Amount. Urea. Pus.	7 cubic centimetres. Urea, 25 grammes per litre. Large amount of pus containing tubercle bacilli.	4 cubic centimetres. 10 grammes per litre. Few pus-cells, no tubercle bacilli.

I made an unconditional diagnosis of tuberculosis of right kidney. The small urea output on opposite side suggested a further study of the secretion from that kidney before a final decision as to operation. I so explained to the husband. I tried to get other bladder specimens to watch the urea excretion, but was informed "they were out of specimens," which rather amusing statement was explained later by the husband frankly acknowledging he had endeavored in every way to disprove my diagnosis, sending specimens to the State Laboratory, to Mulford's in Philadelphia, also, I believe, and in many other directions. Nephrectomy by a confrère without further separation of urines; diagnosis confirmed. Death on third day with uræmic symptoms.

Case III.—Mr. L. had an asthenia of undetermined cause. Because of a peculiar bronzing of the skin, the possibility of Addison's disease had been entertained by one of my professional friends. History of a hæmaturia about six months before, however, suggested a separation of the urines.

	Rіснт.	Left.	Bladder.
Amount. Appearance. Urea. Chemical examination.	Clear. Urea, 14 grammes per litre. Quantitative compa phosphate, and t	10 cubic centimetres. Clear. Same. rison of chlorides, otal purins with the ume amounts on both	20 grammes per litre.

Asthenia, bronzing of skin, and the hæmaturia explained by eliciting a history of chronic malarial poisoning.

Case IV.—Mr. S., thirty-five years old, two years ago suffered from a depression in health, the cause of which I could not determine. I went over his chest most carefully because of a slight cough, but found nothing even suggestive of tuberculosis. I gave him an injection of tuberculin with negative results. Several examinations of the urine were likewise negative. A couple of months in the country restored his health sufficiently to keep him

out of my hands for two years, though he has not been perfectly This spring he began to lose flesh, and again consulted My suspicions as to a tubercular lesion in the lungs were again excited. I had him take his temperature daily. It was found that he was running a temperature between 995° and 100 5° F. which continues to date Pulse has been constantly around 100 An X-ray examination of chest being negative as to any evidence of tuberculosis, I repeated the injection of tuberculin of two years before, giving ten milligrammes at the first dose . no reaction. It was at this time I elicited the history of a venereal sore five years before I conferred with the physician who treated him, who told me there were no secondaries, but that the patient was so worned about the affair he gave him a course of mercury by the mouth This was most unfortunate, for there was no way to exclude syphilis as the cause of his present depression in health except to try the effects of specific treatment. Took mercury three months by the mouth without effect on symptoms. Was not materially improved by about two months in the country

Several examinations of the urine were negative before my vacation. On my return I was greatly surprised on again examing a specimen to find a distinct ring of albumen. Previous failures to detect albumen were explained by daily examinations of the urine, a distinct ring being present one day and entirely absent for the next two or three, perhaps. Attention having thus been directed to the kidneys, I separated the two urines with the Liuys instrument with the following result.

	RIGHT	LEFT	BLADDER
Amount.		15 cubic centimetres	
Urea.	in 45 minutes.		23 grammes per litre
Specific gravity Casts	Few, hyanne and	None	1030
Mucus	Considerable mucus	Same	
Pus cells	Large number of pus cells.	[1
	Number of large, cells, with degenerale but many more on th	round, and caudate d nucles on right side, e left side	

In referring to large amounts of mucus, cells, etc., I refer to all that could be obtained in the tip of the tubes of the centrifuge. The total amount was about 4 cubic centimetre, and macroscopically simply had the appearance of a cloud of mucus.

A low blood-pressure of 110 enables me to exclude contracted kidneys; the blood examination showing only a slight anæmia excludes any malignant disease of the kidneys. (Hæmaglobin, 100; reds, 4,750,000; Sp. gr. 1063; slight leucocytosis.) Diagnosis apparently lies between syphilis of the kidneys and slight pyelonephrits due to colon or other infection, with weight of evidence in favor of latter because of negative results from mercury. In view of the statement of Isräel that mercury does not agree with the syphilitic kidney, and that, on the contrary, potassium iodide does act favorably in those cases, I have recently begun pushing the latter without yet having had time to know what the result will be. An X-ray examination excluded kidney calculus.

A second separation with Luys's instrument gave the following result:

	Right.	LEFT.	Bladder.
Amount, end of one hour.	12 cubic centimetres.	8 cubic centimetres.	
Specific gravity.	1021.	1027.	1032.
Urea.	II grammes per litre.		
Bacteria.	Few.	Abundant.	Abundant.
		Large number granu-	
Casts.	3 or 4 hyalines.	lar.	
Mucus.	Large amount.	Little.	Large amount.
Amorphous urates	Large amount.	But little.	Large amount.
Pus-cells.	Goodly number.	Few.	Few.
Albumen.	Heavy ring.	Same.	Same.
Caudate and large round cells,	Few.	Abundant.	Few.

A week later I catheterized both ureters. The bladder urine was almost free from any deposit when centrifugalized, and there was the merest trace of albumen; catheters were pushed to pelvis on each side:

	Right	Left.	BLADDER
Amount. Amount of de posit when		5 cubic centimetres 2 cubic centimetre, mere cloud.	
:		tly clear	Clear. None
Large, round, and caudate cells, with granular protoplasm and	yeast. Great quantities.	None.	None
nucleus gone Casts. Specific gravity Urea Albumen	Few hyaline 1015 12 grammes per litre Trace	None 1020 Same Same	None Not taken Not taken, Same

It will be seen from this last separation that the ureteral catheter emptied a slight retention in the right pelvis, and still further upholds the diagnosis of a pyelonephritis

[Note (two months later) -A bacteriological examination of the catheterized specimens did not demonstrate a pathogenic organism. The patient has gained twelve pounds in two months since the administration of strontium iodide was begun, and for the first time in six months is without fever l

REFERENCES

- 1 Tuchmann Wien med Woch, August 1, 1874
- Simon Sammi klin Vortr Gynak, 1875 No 28
- Winkle, Pitha Billroth, Allgem Chirutgie
- Grunfeld Allg Wien Med Zeit, January 20, 1876, p 223
- Stein. Berl klin Woch, January 19, 1874
- Pawlik Archiv f Gynak, Bd xviii, 1881 'Warnots J de med, de chir, et de pharm, 1886, Vol 1xxxii, pp 337 and
- *Newmann Glasgow Medical Journal 1883 Vol xx, p 133
- Silbermann Berl klin, Woch, 1883 p 518
- "Harrison London Lancet, 1884 Vol 1, p 108
- " Hurry Fenwick. The Medical Society Proceedings, London, 1887, p 276 "Weir Medical Record, 1883 p 385
- "Albarran Rev d gynec. et d chir abdom, May, 1897 "Bickersteth London Lancet, 1904, Vol 1, p 859
- "Lambrotte. J de med, de chir, et de pharm, Brux., 1890, pp 607, 655
- "For example, Verhogen la Policlinique, 1898, Vol vii, p 53

- ¹⁷ Neumann. Deutsch. med. Woch., Leipzig, October 21, 1897, p. 690.
- ¹⁸ Kelly. Johns Hopkins Hospital Reports, January, 1899, p. 116.
- ¹⁹ Harris. Journal of-American Medical Association, January, 29, 1898.
- ²⁰ Lambert. Paris Thesis, 1902. De le séparation des urines de deux reins.
- ²¹ Luys. La séparation des urines de deux reins, Paris, 1904.
- ²² Escat. Assoc. franç. d'Urologie, Paris, 1901, p. 528.
- 23 Loc. cit., p. 138.
- ²⁴ Legue. Bull. et Mém. d. l. Soc. d. Chir., Paris, 1902, p. 796.
- ²⁵ Cathlin. Le cloisonnement vésical et la division des urines, Paris, 1903, p. 45.
- ²⁶ Rochet and Pallenda. Gaz. hebd. d. med. et d. chir., December 14, 1902, p. 1177.
- ²⁷ Tuffier. Bull. et Mém. d. l. Soc. d. Chir., Paris, 1900, p. 585.
- 28 Isräel. Berl. klin. Woch., 1899, No. 2.
- ²⁰ Hartmann. Bull. et Mém. d. l. Soc. d. Chir. d. Paris, 1902, p. 266.
- ³⁰ Krotoszyne. Transactions of Medical Society of State of California, 1897, p. 346.
- ⁸¹ Albarran. Ann. d. mal. d. org. gen.-urin., 1903, p. 1253.
- ²² A. Preciado Y. Nadal. La séparation des urines dans les lésions medicales, Paris, Thesis, 1903.
- ²³ Illyès. Ann. d. mal. d. org. gen.-urin., 1902, p. 335.
- ⁸⁴ Edebohls. Medical Journal of New York, May 28, 1904.
- 25 Quoted by Luys.

DISLOCATIONS OF THE PATELLA, WITH ROTA-TION ON ITS HORIZONTAL AXIS

BY WILLIAM S CHEESMAN, MD.

OF AUBURN, NEW YORK

DISLOCATIONS of the patella with rotation on its perpendicular axis are not specially rare. In these the bone is revolved through 90°, one or other lateral edge resting in the groove between the femoral condyles (Fig. 1), or through 180°, so

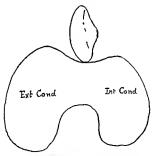


Fig. 1 - Dislocation with rotat on on perpendicular axis

that its articular facets look directly forward, the tendons of the quadriceps and ligamentum patellæ being twisted or ruptured

But of dislocations with rotation on the horizontal axis, and the hone wedged in the notch between tibia and femur

(Fig. 2), only five cases have been reported, abstracts of which will be found below. To these I am able to add a sixth, the history of which is as follows:

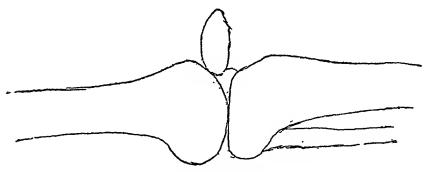


Fig. 2.—Dislocation with rotation on horizontal axis.

On Friday, July 1, 1904, Drs. Conway and O'Brien, of this city, were summoned to attend John —, aged thirteen years, who had been thrown from a moving railroad train and sustained an injury of the left knee. The patella could be plainly felt projecting

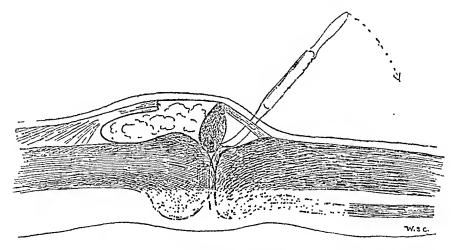


Fig. 3.—Luxation of patella on horizontal axis. Joint cavity distended with blood. Method of reduction.

straight forward from the space between tibia and femur. The fingers inserted above it entered the joint cavity, only skin and superficial tissues intervening. The leg was readily flexed and extended. (Fig. 3.)

Uoder chloroform all efforts to lift the patella out of its false position failed, and like ill-success attended a second trial on the following morning (Saturday) Saturday evening, at the Auburn City Hospital, Drs Conway and O'Brien kindly referred the case to me, and with the patient chloroformed I was able fully to verify their diagnosis already made, but was likewise unable to reduce the displacement. The patella moved slightly laterally, and its engaged superior border could be felt to grate on the cartilaginous surfaces of the bones, but it could not be lifted out of its insertion between them, being evidently held there by the stretched liga mentum patellæ and the fibres of the joint capsule. It was judged that the quadriceps tendon must be ruptured, thus permitting the fingers to dip deeply into the joint above the displaced patella, and allowing full flexion of the leg. There was at the time of my examination much swelling of the whole joint Preparations were at once made for operation, which was done the following morning, July 3

Under ether a large semicircular flap, convexity upward, was turned down, exposing the tendinous structures of the knee. All tissues were infiltrated with blood. A longitudinal opening made in the joint above the patella gave exit to much bloody serum and clots. The joint cavity was irrigated with hot saline solution till clean. Efforts were then made by the hands and by lion-jawed forceps to lift the patella from its lock in the joint. All were unsuccessful. The bone was so firmly held by the tense ligamentum patellae and the other tendinous structures that the grip of the lon-jawed forceps repeatedly slipped. Finally, through a slit near the ligamentum patellae, the curved end of a blint dissector was introduced under the patella in the manner shown in Fig. 3, and the bone pried out of its engagement to the joint, whereupon it leaped suddenly into normal position.

The upper edge of the patella Intherto hidden between tibia and femur was now seen to be completely severed from the quadriceps tendon. No particle of the tendon remained attached to it, but some bony fragments torn from the knee-pan remained attached to the tendon. A final wash out was given the joint cavity, and the separated tendon sutured by chromicized gut to the periosteum and aponeurotic fibres of the patella. Other divided structures were similarly united, and the large flap brought into place by a subcutaneous catigut suture, a few strands of silkworm gut

being left in the lower end of the incision on either side of the joint, as a drain. Gauze dressing. Limb straight in plaster, and in bed elevated 45° to relax quadriceps.

Healing virtually reactionless. Highest temperature recorded 100° F. On the twelfth day joint examined through a window cut in the splint, and found without effusion, and the wound healed per primam, except where a small area of skin had sloughed at the upper border. This healed quickly. No use of joint allowed till twenty-third day, in order that union between patella and quadriceps tendon might become strong. Slight flexion was begun and patient allowed to walk. Massage. By August 8 (thirty-sixth day) flexion to right angle, and free use of joint

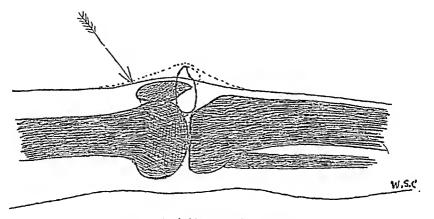


Fig. 4.-Probable mechanism of injury.

encouraged. On September 10 recovery of all motions complete. Tendon of quadriceps felt firmly united to upper border of patella.

The mechanism of the injury seems plain. Whether the leg were flexed or extended, force delivered in the direction of the arrow (Fig. 4) at point of attachment of quadriceps tendon to the patella could sever this attachment, turn the patella on its horizontal axis, and, continuing, push its freed upper border downward into the crotch between femur and tibia, where it would be locked by the patellar ligament and capsular fibres stretching like guy-ropes of a tent in all directions.

For purposes of comparison, a brief résumé of the other cases on record is added.

CASE I -- MIDELFART. "A Rare Dislocation of the Patella" Norsk Mag f Laegevidenskaben, 1887, Vol xlvn, p 588.

A boy aged twelve years fell on a sharp stone, receiving what was taken by the physician first in charge for a fracture of the patella. The supposed lower fragment was felt immovably fixed, while the upper could not be found. To clear up the case, Midelfart opened the joint transversely. It then appeared that the quadriceps had been separated from the upper margin of the patella, taking with it small fragments of bone, and that the patella had been turned directly forward, articular surface downward, and forced into the space between femur and tibia, the ligamentum patella remaining infact.

Patella elevated into position by manipulation, and capsule and skin united by catgut. Healing by first intention. Ultimate result as to function not stated.

Case II —Szuman Archiv f klin Chirurgie, 1889, Vol xxxix, "Eine seltene Form von Patellarluxation"

February I, 1888, F S, aged twenty seven years, was drawn under the cylinder of a hay cutting machine. Limped to house, but could not extend leg, which was bent at an obtuse angle. Pain on motion. Ecclymoses, ordema, and a visible and palpable depression in place of the patella. From the space between the external femoral condyle and tibus is a sharp transverse projection (the patella). A tightly drawn cord goes from this protion to the quadraceps smaller (ble quadraceps smaller), and from the foremost angle of the projection another to the tubercle of the tibia (ligamentum patella). (Fig. 5)

Chloroform Attempts at reduction failed, as the patella could not be rolled over the external condyle. Leg moved freely, and could be bent inward sharply, hence laceration of internal lateral ligament, but could not be straightened beyond 135° on account of patella wedged between the bones.

Operation through resection incision (which, not stated). After open ing joint, patella could still not be gotten over the external condyle. It could be drawn forward a little, but always slipped back. Therefore cut ligamentum patellæ. Joint now gaped widely, showing patella deeply wedged between external condyle and this, the anterior surface looking downward, posterior surface apward. Crucial ligaments form and capsule lacerated in several directions, notably by the sharp anterior angle of the external condyle. After several efforts, pushing the patella forward while lifting it off from the external condyle, an assistant pulling it with hooks, the bone shipped with an audible snap into normal position.

Joint drained, ligamentum patellie sutured with catgut, crucial not sutured, as they seemed to lie well together, splint and clevation. Afterrile course. Splint continued several weeks, two months later knee gave 20° motion

CASE III —DEADERICK "Case of Rupture of Quadriceps Femoris Tendon with Dislocation of Patella beneath the Intercondyloid Groove of the Femur" Annals of Surgices, 1800, Vol. XI, p. 102

Youth aged nineteen years, fell while trying to board a train, and dislocated left patella. Bone torn loose from upper attachment, and turned on lateral axis three-eighths of a circle, its longitudinal axis forming an angle of 45° with the tibia. Chloroform. Strenuous efforts made at reduction, but all failed, as did others made next day. How strenuous were these efforts appears from the fact that a four-pronged steel hook was in-

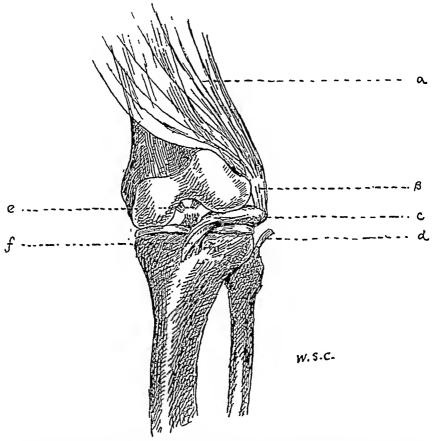


Fig. 5.—Szuman's case, reproduced from illustration accompanying his report. a, Quadriceps extensor; b, quad. extensor tendon; c, patella; d, ruptured ext. lateral lig.; e, ruptured crucial lig.; f, lig. patella.

serted through the skin into the patella, and great force used in the endeavor to lift it out of its lock between the bones. Author then by means of an extemporized windlass, strong enough, he thinks, to lift an ox, and a cord slung about the patella, tried to pull it away from its engagement, but again scored a failure. Then lifting the patella with one hand, and pulling on its upper edge in the direction of the thigh axis with the other, it turned with a sudden jerk and fell into normal position. The

windlass must have stretched the tendons, as the same manœuvre had been repeatedly tried before

CASE IV—SCHMIDT Centralbl f Chrurgie, No 41, p 1023, 1900
"Em Fall von Luxation der Patella nach Abriss der Quadricepssehne"

On December 25, 1899, B, aged sixteen years, miner, fell, striking the knee on edge of a rail Sudden pain above patella Knee swollen and at right angle Slight extension possible, but much pain Under edge of patella points forward, above it a cavity admitting three fingers, in which can be felt the front (now upper) surface of the patella and convenience of the patella a



Fig. 6 -Sketch of Rontgen photograph accompanying Schmidt's case.

dyles of the femur Upper border cannot be felt, because set in the space between femur and tibia (Fig 6) Efforts to reduce unsuccessful

Incision in perpendicular direction, seven centimeters in length over middle of the knee. Many clots removed from the joint. A finger was introduced behind the luxated patella from the side, and with exertion of considerable force it was lifted and returned to its position. The ruptured quadriceps tendon was not sutured, because this was regarded as a "complication" of the operation, and as preventing passive motion for weeks. Healing by first intention. Passive motion begun on eighth day. Entire recovery of all motions of the joint.

CASE V.—KUETTNER. Zentralblatt f. Chir., No. 27, 1904, p. 168. "Demonstration eines Praeparates von horizontaler Luxation der Patella."

A woman sixty-four years old fell from wagon, receiving a penetrating wound of knee. Patella not to be felt. Suppuration of joint already begun. Amputation of thigh; death.

On dissection, patella found between outer condyles of femur and tibia, and rotated on its transverse axis. Quadriceps tendon, somewhat twisted, lay on outer surface of knee behind the femur, and had been perforated by the external lateral condyle. Articular surface of patella looked towards tibia. Ligamentum patellæ intact. Lateral and crucial ligaments ruptured.

The mechanism of the injury, author remarks, must have been a forced adduction of leg, causing joint to gape widely, while patella luxated outwardly and was forced into joint.

This case is similar to Szuman's, except for the fatal addition of a penetrating wound of the joint; and in this the patellar facets looked downward, in Szuman's upward.

In reviewing these cases, reduction is seen to have been accomplished only once by manipulation alone (Deaderick). In Midelfart's, Szuman's, Schmidt's, and my own, it was necessary to open the joint in order to free the patella. All of the operative cases healed by primary union, and the usefulness of the joint was recovered.

Midelfart and Deaderick speak of this variety of displacement as "Downward Dislocation," a term which has been perpetuated by some recent writers on surgery. It is evident, however, that this designation is but partially descriptive, and includes too much. The essential and distinguishing feature, viz., rotation on the horizontal axis, is omitted, while other dislocations without rotation on either axis might fairly come under this head. A more precise classification of patellar luxations in general would, therefore, be: Dislocation upward or downward, outward or inward; dislocation with rotation on perpendicular or horizontal axis, and combinations of these varieties.

The cases reported by Midelfart, Deaderick, Schmidt, and myself were dislocations with simple rotation on the horizontal axis. Those of Szuman and Kuettner present a complex of horizontal rotation and outward displacement, and must have been produced by a combination of forces.

THE MATAS OPERATION FOR ANEURISM

REPORT OF A CASE OF POPLITRAL ANEURISM SO TREATED

BY HERMANN B GESSNER, MD. OF NEW ORLEANS.

Demonstrator of Operative Surgery in the Tulane University of Louisiana

A NEGRO, thirty-two years of age, was admitted to the Charity Hospital of New Orleans, June 21, 1904, with an aneurism of the right popliteal artery, involving the middle and lower portions of that vessel The tumor was five inches in the long axis of the limb by four and one-quarter inches transversely. He gave a history of syphilis four years before, with one year's treatment First noticed pain and swelling in the limb two months before admission

June 23, 1004 With an Esmarch constrictor in position, an incision was made in the median line posteriorly, this exposed the internal popliteal nerve, which was retracted inward incision was now carried through the aneurismal sac. No clots The interior presented a thin layer of whatever were found laminæ and fluid blood The lower opening was found early, being quite superficial and to the inner side, dark blood was escaping from it in small quantity This opening, which was quite oblique, was at once sutured with a continuous Lembert suture of No 1 chromic catgut After a prolonged search, during which the sac was split up to its full extent, the upper opening was found di rectly above the lower at a distance of one inch (The aneurism had evidently developed towards the anterior and external aspects of the artery) It had been hidden from view by a fold of the sac, dark blood was escaping from this opening also No 3 chromic catgut was used in the form of a continued Lembert suture for the closure of this orifice Removal of the constrictor was followed by escape of bright arterial blood above, showing either that the closure was defective or that some collateral existed, the opening of which (quite near by) had escaped detection hæmostasis was effected by a massive Lembert suture taking up at least an inch bite of sac wall on either side. The result

of this step was the firm approximation of the walls of the aneurism in the upper third, with a resultant approximation of the remaining two-thirds of the sac wall, so that no Neuberizing was necessary to do away with any dead space. A small iodoform gauze drain was introduced into this lower, unsutured portion of the aneurismal cavity. The skin wound was narrowed with silkworm gut. At the termination of the operation pulsation could not be felt in the dorsalis pedis. aseptic gauze and cotton dressings were applied, with a cardboard gutter-splint posteriorly. The foot was elevated about First dressing four days later; a moderate infecfour inches. tion existed; iodoform pack replaced by a smaller one. Foot warm: pulsation perceptible in dorsalis pedis. The infection diminished steadily; patient sat up July 21; on August 15 his wound was entirely well. There was no pulsation whatever; a slight tendency to ædema was observed.

Examination on September 3 showed the following condition of affairs: Patient in excellent health. General appearance of limb good; walks with a little stiffness (has been walking moderately since August 15); scar hypertrophied, with a little erosion due to friction of clothes and bad management of scab. Circumference of limb at middle of scar fifteen and three-eighths inches as against fourteen and three-eighths inches for opposite limb at same level. This difference is attributable to the hypertrophied scar on the one hand, and on the other to the presence of the aneurismal sac, which was left in situ at the time of operation. the outer side of the lower quarter of the scar is a non-resistant swelling, which I take to be a venous dilatation, probably in the upper portion of the external saphenous. Neither here nor elsewhere in this region is there any sign of aneurism. Pulsation is palpable in the dorsalis pedis, not in the posterior tibial behind the malleolus

Comment.—The writer had had not only the good fortune to read Dr. Matas's complete and lucid account of his method of treating aneurism by operative interference, but also the privilege of assisting him in at least two of his cases,—one femoral, the other popliteal. The good results observed after these operations, and the disastrous ones known to have resulted from other methods, led to the adoption of the method in the case now reported.

I believe this case to have borne out one of the important claims made for the method, viz, non interference with the collateral circulation. It was evidently a case of recent origin, as shown by the fact that the patient, an intelligent man, had noticed it but two months before, and by the complete absence of clot, with but slight lamination. In spite of this recent development, but little time having been allowed for collateral circulation to develop, the limb was supplied with blood after operation, pulsation being observed in the dorsalis pedis at the end of four days. Again, the statement that a moderate degree of in fection is not incompatible with success was confirmed, this fact makes the operation more generally applicable, not restricted to specialists operating under specially favorable conditions.

The technique varied but little from that described by Dr Matas, the variation consisting in the fact that the walls of the aneutismal sac were brought together directly instead of being turned in on themselves after the method of Neuber

LOSS OF ENTIRE LOWER LIP.'

REPAIR BY FLAP FROM THE ARM.

BY STEPHEN WATTS, M.D.,

OF BALTIMORE,

Assistant Resident Surgeon, Johns Hopkins Hospital.

THE following case is that of a boy, fifteen years of age, who was admitted to the service of Dr. Halsted on July 6, 1904, with the history of having had his lower lip bitten off two days before by a circus pony with which he was playing.

On examination, the entire lower lip was found to be absent, even the periosteum of the lower jaw having been stripped off in places. The wound was clean and free from infection.

Considering the great extent of the wound, it was thought best to cover the defect with a flap from the arm rather than to attempt to obtain a flap from the face or neck. Accordingly, a large flap was dissected up from the right upper arm. This flap, which included skin and subcutaneous fat, was about twelve centimetres in width and eighteen centimetres in length. Its under surface and the raw surface of the arm, from which it was taken, were covered with grafts removed from the thighs. All of these grafts took well, and at the end of ten days we had a flap with skin upon both sides. Some of the skin upon its under surface was intended to form a substitute for mucous membrane upon the unattached portion of the lip, and to some extent prevent subsequent contracture.

The patient had a bad bronchitis for some time following this operation, and further operative procedure was thus postponed more than a month. During this delay, the flap, which had already become considerably shortened by the sloughing of its distal extremity, due to imperfect circulation, contracted to a wonderful extent. (Fig. 2.)

On August 18 we dissected up the flap somewhat farther, in

¹ Read before the Johns Hopkins Hospital Medical Society, October 17, 1904.



Fig. 1—Condition before beginning treatment entire lower tip absent exposing lower you



Fig. 2.—Flap-prepared grafts upon arm and upon under surface of flap covered with silver foil.



F G 3 -F ap brought up to face (Photograph taken on operating table)

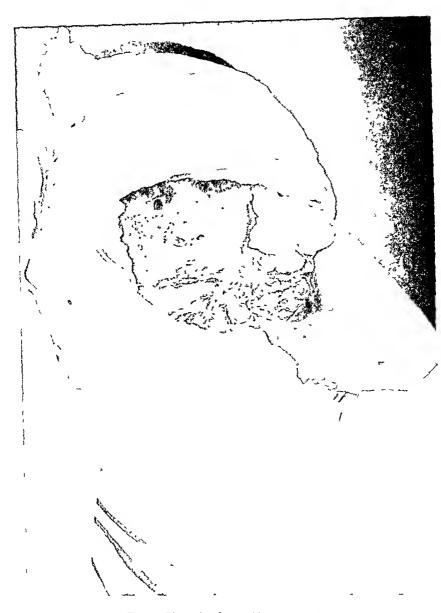


Fig 4—Plaster bandage holding arm in place.



Fig 5 -F nat result



order to lengthen it as much as possible, and then sutured its free extremity to the left side of the wound in the hp. A small portion of the vermilion border, which had been preserved on this side, was sutured along the upper edge of the flap

The arm was held in place by means of a plaster east for a period of about three weeks. The flap was then severed from the arm. This was done under local anaesthesia in several stages to allow the circulation to become more perfectly established. The patient seemed very comfortable in the east, the strained

position of the arm causing almost no pain. At two subsequent operations, at intervals of two or three weeks, the lower and right borders of the flap were trimmed up and sutured in position. A very good functional and cosmetic result was thus obtained.

The accompanying photographs show very clearly the various stages of the operation

A REGULABLE COMBINED DROPPING AND POUR-ING DEVICE FOR THE ADMINISTRA-TION OF ANÆSTHETICS.

BY VICTOR COX PEDERSEN, M.D.,

OF NEW YORK.

Anæsthetist to the Roosevelt Hospital; Instructor in Anæsthetics and Anæsthetist to the New York Polyclinic Medical School and Hospital.

Long ago the dictum has ceased to be a matter of dispute, that all medicinal agents act the most safely for the patient and the most satisfactorily for the physician, when their administration is graduated as accurately as possible in accordance with the susceptibility of the subject and with the desired degree of therapeutic effect.

In the field of anæsthesia, the first agent as to which this fact was established was chloroform. To use the exact words of Sir James Simpson, the original method of administration was to deliver the vapor "powerfully and speedily," in order to prevent the excitement incident upon slower procedure. So many deaths were the result of this technique, that by 1860, or about thirteen years after the anæsthetic value of chloroform was first applied to human beings, he recommended the drop-by-drop method of delivery. No one who is worthy of reputation for skill in anæsthetization has ever since that time departed from this mode of using this potent and withal rather dangerous general anæsthetic.

The great advantages of the drop-by-drop exhibition of chloroform are:

(1) Determination of dose in accordance with susceptibility; (2) control of the amount of drug administered from moment to moment; (3) accurate variation in this amount at any period of the operation as indicated by the susceptibility, by the character of the operative technique, or by both; (4) greater safety of the patient. The fourth item is inherent in the preceding three factors.

The manifest value of these elements of chloroform anæs thetization suggested application of the drop-by drop procedure to ether narcosis and to anæsthesias produced by chloroformether mixtures or by other general anæsthetics. At the present time, therefore, the wisdom of drop by-drop employment of general anæsthetics is not questioned, and the desideratum is established for one instrument which will combine regulability of dropping and pouring, if need should arise, as often does in the early stages of ætherizations, and which will be available for any other general anæsthetic or mixture of anæsthetics

A large number of dropping fixtures and dropping bottles have been devised with the purposes of securing controlla ble drop-by drop delivery. In the effort to design one which corrects all the disadvantages of the others, the regulable combined dropping and pouring attachment which is the subject of this paper has been produced after much experimentation.

The disadvantages of the metal dropping devices which have been corrected are the following First, practically all others are so attached to their bottles that if the latter be broken a renewal cannot be made excepting, as a rule, through a surgical instrument house, and at rather great loss of time and much expense The bottle of the author's attachment may be replaced by a common wide mouth bottle at any drug shop and in most households instantly and at practically no expense Second, the parts of the droppers now on the market are in themselves usu ally so small, delicate, and complicated, that they are easily worn, damaged, and put out of order, and then require an instrument-maker for the repairs The dropper of the author is small enough for neatness of appearance and convenience of packing and management, and sufficiently large to be durable and strong The conical seating of the plug into the socket takes up the wear as it occurs It cannot be damaged by any ordinary use or accident. It is extremely simple in construc tion and may usually be repaired by the owner Third, the bottles of the usual droppers are so small that they are suitable only for chloroform. The four- and six-ounce bottles of the author's device are available for ether, chloroform, and their mixtures, either of these sizes being furnished with the dropper as desired. Fourth, the dropping of the majority of fixtures is rather difficult to regulate, somewhat uncertain in action, and unexpectedly will change to a pouring. In the writer's instrument the dropping is accurately controllable, is with difficulty thrown out of adjustment, and nevertheless will deliver a stream by simply inverting the bottle, or turning the plug as a water faucet, as detailed later. Fifth, the corks of most of this type of bottle are specially cut and require skilled hands to replace when they become broken or damaged. Any good cork is all that is needed in the author's arrangement, and the hole may be cut into it with a standard cork-borer, such as is sold with the instrument if desired.

The standard glass chloroform drop-bottle has proved in the hands of the author the best of those now on the market, but its limitations suggested the instrument to be described. First, destructibility of the essential parts; second, rather high cost, especially in virtue of its fragility; third, difficulty of securing a bottle with stopper and neck carefully ground and with the flange of the stopper at a proper distance from the flange of the neck, so as to encourage dropping and discourage pouring. This distance should be about a sixteenth-inch; fourth, the particular tendency to pour unexpectedly which results from the fact that chloroform may trickle down both the upper or air and the lower or fluid slots, and thus overload the capillary space between the stopper-flange and the neckflange. The bottle then inevitably pours.

The manner of obviation of these limitations has been described so far as the first two are concerned; the third is corrected by the adjustable disk on the plug of the writer's dropper as later detailed; and the fourth is corrected by the air-vent tube, whose free end is always above the fluid-level, and therefore makes pouring impossible unless the bottle is deliberately turned over so that the tube is submerged and becomes the exit of the contents, thus pouring, while air enters through the slots.

The parts of the dropper of the author are as follows: The first essential is a socket (Fig. 1) bearing a flange, with a



Fig 1 -Socket without the cork



Fig 2-Plug flange and lock nut

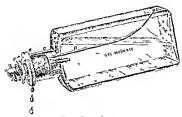


Fig. 3 - Dropper in action

knurled edge (B, Figs. 1, 3), and an air-vent tube (D, Figs. 1, 3) piercing the flange. The neck of the socket has a conical lumen (F, Fig. 1), in whose wall opposite the air-vent is a groove (G, Fig. 1) extending upward two-thirds the length of the socket. On the surface of the flange indicating the axes of the groove and vent is the guide-line (shown in phantom R, Fig. 1), whose purpose will presently be shown. The second essential is the plug (I, Fig. 2). The neck (K, Figs. 2 and 3) is threaded for the disk (N, Figs. 2, 3) and its lock-nut (O, Figs. 2, 3). The disk is of the same dimensions as the flange of the socket. The body of the plug has two grooves (Q, Fig. 2) opposite each other, one wide for ether and the other narrow for chloroform. The pinion (J, Fig. 2) passes through the head in the axes in these grooves, therefore serving as an indicator of the position of the grooves and as a handle for turning the plug in the socket precisely as a water-faucet. The length of the grooves is such that when the plug and socket are assembled so that their respective grooves are apposed, they overlap each other, and thus form a tortuous channel into the cavity of the bottle, about one-eighth of an inch in diameter, which will deliver a stream large enough for all purposes. If now the plug is turned, its groove, Q, slowly moves away from G, decreasing the overlap until finally that is a mere capillary channel precisely in the manner of a water-faucet. The power of decreasing or increasing this outlet is the secret of determining the quantity of anæsthetic delivered,—copious, moderate, or small by any desired graduation. The fluid passes through the overlap into the relatively larger capillary space, Q, and then reaches the extensive capillary interval between the flange, B, and the disk, N. This arrangement constitutes a tortuous space always capillary, but largest at the edge of the disk and flange, so that fluid delivered into it through the overlap is compelled to spread out and therefore to drop. The whole success of the device rests upon this fact: a virtually funnel-shaped capillary space receives its fluid at the small overlap and compels it by capillarity to extend itself until the whole space is filled. Dropping then begins as the supply through the overlap

is delivered. The bottle never pours if this supply is correctly determined. The quantity of anæsthetic to be delivered rests upon the adjustment at the overlap. The manner of delivery thereof, namely, in large, slow drops, in large, rapid drops, in small, slow drops, in small, rapid drops, or in any intermediate graduation desired, rests upon the size of the space between disk and flange, the narrower this space is the smaller and more rapid will the drops be. After this detail is determined, the disk is locked by the lock nut

The assembling of the device is carried out as follows The bottle is filled The socket and cork are placed into the neck. The plug is then inserted into the socket in such a manner that the groove is opposite the guide-line on the flange, which brings the plug-groove and the socket groove directly over each other The disk is now run down the neck until it is a thirty second-inch away from the flange. The capillary spaces are now filled by pouring, then the quantity of anæsthetic desired is determined by turning the plug to the right or left (as a faucet), and finally the size and rate of the drops are fixed by adjusting the disk. These details require a few seconds of time When the adjustment is made, the bottle will drop by the hour without interruption or variation. At any moment it may be made to pour by turning it over so that the airvent is submerged, or by turning the plug so that the channel is full size, that is to say, so that the plug groove and socketgroove completely correspond The author has given the dropper the test of a full year's use in many cases of all kinds

He desires to extend cordial appreciation and thanks to Messrs George Tiemann & Co for many valuable suggestions and kindly interest in producing this satisfactory instrument

In his hands it has never failed to work perfectly

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 12, 1904.

The President, Howard Lilienthal, M.D., in the Chair.

WOUND OF URETER DURING HYSTERECTOMY; ANASTO-MOSIS; SUBSEQUENT NEPHRITIS; NEPHRECTOMY.

Dr. F. TILDEN Brown presented a single woman, forty years old, who was admitted to the Presbyterian Hospital on June 16, 1904. Her family history was negative. She had never had any children or miscarriages, and her previous history was good. Nine months ago her abdomen began to enlarge, without pain or other symptoms. This enlargement gradually continued. On July 21 a panhysterectomy was done for the removal of large fibroids of the uterus and broad ligaments, and during the operation the right ureter was divided. An immediate anastomosis was made, but a few days later urine began to discharge from the wound, and subsequently there was vesical irritability, with purulent urine, and at times involuntary micturition. The temperature ranged from 101° to 103° F. for two weeks, then from 100° to 101° F. until the fortieth day, when on July 30 it suddenly rose to 103° F. The patient complained of chilliness and pain in the right lumbar region. There was still some urinous discharge from the wound. The patient was weak and anæmic; the pulse was rapid and small, but regular. The right kidney was palpable and slightly enlarged; there was no tenderness; no rigidity. Leucocytes, 17,500. The urine contained pus and albumen and a few granular and hyaline casts. On August 2 the right kidney was exposed through a lumbar incision. It was found to be congested and partly adherent to its bed. After transfixing the pedicle, the

kidney was incised to allow the escape of blood and thus reduce its bulk, and was then excised. The stimp of the ureter was cautienzed after ligation. The opened fatty capsule was sutured to the transversalis fascia, and a cigarcite drain inserted to base of wound. The patient made a rapid and steady improvement, and was discharged on the thirty-third day with a very small granulation at the lumbar scar and a small ventral superficial sinus. The pathological report was made by Dr. Tuttle, who stated that the kidney was much congested. There was slight round celled infiltration and many casts.

TRAUMATIC RUPTURE OF URETER, EXTRAVASATION OF URINE, PYONEPHROSIS, NEPHRECTOMY

DR Brown presented a boy, nine years old, who was admitted to the Presbyterian Hospital on July 2 1004. His mother died of pithiss. The patient had always been delicate and had measles and diphtheria in infancy. Three weeks ago he was struck by a horse car and caught under it, sustaining an injury to the left inlo costal region. He was not unconscious, but vomited frequently. On the day of his admission two ounces of urine were obtained by catheterization. The urine contained a trace of blood. The abrassion on the left side of the abdomen partly healed but on the opposite side a tumefaction appeared thought to be a hæmatoma. The patient was discharged from the hospital on June 26, apparently well. Since then he had been up and about, but complianted of some pain in the right side, and the right side of his abdomen was increased in size. He still had occasional attacks of vomiting

The patient was readmitted to the hospital on July 2. At this time he was anzenic and poorly nourished, and a systole basal murmur was made out. The abdomen was prominent and bulging in the right flank, with dulness outward from the median line and dilated veins over the tumor chiefly above the level of the umbilicus. Bimanually, a fluctuating tumor could be distinctly out lined just below the tip of the minth cartilage not moving with respiration. There was some tenderness over the mass. A rectal examination was negative. An X-ray picture of the trunk, the injection of tuberculin, and the transmitted light test were all negative. Temperature on admission 99° F. pulse, 96. Leucocyte count, 14 000. The urine was 1030, acid, no albumen, casts nor blood cells. No tubercle bacilli.

On account of the small caliber of the urethra, a cystoscopic examination was made under full anæsthesia. The bladder was seen to be normal. The ureteral catheter entered the left ureter rapidly and emitted normal urine. The mouth of the right ureter was open, but ureteral catheters of the smallest size and with different shaped tips would not pass beyond three-quarters of an inch, and no urine flowed from the catheter. From this it was inferred that the ureter was occluded or ruptured, and that the tumor was due either to a greatly distended renal pelvis and kidney, or to an extrarenal accumulation of urine. Subsequent developments showed that the latter was the case, and that the ureteral lesion giving rise to the extravasation was a lateral rent at a point one and one-half inches from the hilum. An explanation of the ureteral occlusion at a point three-quarters of an inch from the vesical papillæ was never obtained.

On July 7, through a right lumbar oblique incision, a retroperitoneal cystic tumor was opened, and thirty-six ounces of urinous fluid evacuated. The kidney and its adipose capsule, which were found forced well above the site of the accumulation, were now drawn down into the wound, and the fatty envelope examined for a rent. None being found, it was opened to expose the kidney, which was apparently normal in appearance. The site of the lesion giving rise to the urinary extravasation had not been determined thus far, but the occluded lower end of the ure-ter was suspected as being in some way responsible. The wound was partly closed and drained. There was a free urinous discharge from the wound. The temperature remained normal until the sixteenth day, when it rose to 103° F. The patient vomited and had a very severe frontal headache. The right kidney was palpable and somewhat tender.

On July 28, through a right iliac incision, an attempt was made to reach the kidney; but this proved inadvisable, because, on trying to reflect the parietal peritoneum, it was torn, due probably to pathological conditions resulting from the previous extravasation. This wound was then closed with chromic gut and the former right lumbar incision reopened and enlarged. The kidney was exposed, and on stripping off the fatty capsule the cortex was found to be covered with slightly raised yellowish-red and purplish lesions. After freeing the kidney and before ligating the

ureter, a quarter-inch rent was discovered about an inch and a half from the hilum. Through this a little urine could be made to sesape upon squeezing the kidney, and a probe passed through it entered the renal pelvis. The pedicle was transfixed, ligated in three separate parts, clamped and cut, and the kidney removed The cavity was irrigated and the opened fatty capsule held by sutures to the transversalis fascia. A single cigarette drain led to the pedicle, and the wound was almost closed with chromic gut. In the second and third days, from thirty five to forty five ounces of urine were passed. All discharge from the wound ceased on the tenth day. The patient was discharged on the twenty second day after the nephrectomy, with only a tiny granulation at the site of the wound. The pathologist reported an extensive infil tration of leucocytes in streaks out through the cortex, evidently the result of an ascending inflammation. The kidney pelvis was congested.

NEPHRECTOMY FOR RENAL TUBERCULOSIS

DR BROWN presented a man, thirty years old who was ad mitted to the Presbyterian Hospital on July 1, 1904 His family history was negative He was addicted to the moderate use of alcohol Three years ago he had syphilis, for which he was under treatment for two years There was no history of gonor rices nor other illnesses.

Six months ago he began to suffer from frequency of muturition, with some blood at the end of the act, and pain at the head of the penis. He was treated at Mt. Sinai Hospital and was soon able to return to his work. Ten weeks ago his symptoms recurred, and the bleeding was more severe. Six weeks ago he was compelled to take to his bed, and in addition to his other symptoms he suffered from diarrhoea and pain in the right lumbar region.

On admission, the patient was micturating about five or six times at night. The urine contained so much pus that it was all most milky. There was slight tenderness over the right kidney. No tumor could be felt. By rectal examination a softened area in the prostate could be made out. By the three glass test the first urine passed was turbud with pus, the second more so, and the third and last almost the consistency of soup. It also contained a heavy trace of albumen. The patient's temperature

ranged from 100° to 103° F. daily. He was poorly nourished, anæmic, sallow, and apathetic. The superficial glands were enlarged.

The case was regarded as one of suppurative seminal vesiculitis on the left side, and on July 12, through an inverted Y-incision in the perineum, the bulb was exposed, and upon further dissection the distended left seminal vesicle came into view. As an aspirating needle gave no fluid, the vesicle was incised, but only normal appearing seminal fluid escaped. This sac was evidently not the source of the patient's pyuria. A very small cigarette drain was placed in the vesicle, and a larger one between the rectum and prostate, and one-half of the wound closed with chromic-gut sutures. The following day the patient's urine showed the same extreme pyuria as formerly.

On July 19 cystoscopy was done under local anæsthesia. A patch of ulceration, covered with adherent muco-pus, was seen about the right ureteral orifice. The irregularities due to the ulceration made it impossible to introduce a catheter, but the picture was typical of an associated renal tuberculosis. There were no other vesical lesions. The left ureter was readily catheterized and gave a clear amber urine, which on examination was found to be normal. For the next ten days the patient's urine was frequently examined for tubercle bacilli, but with negative result. The perineal wound healed rapidly. The patient complained of occasional right lumbar pain, and his temperature became more elevated.

On August 6 the kidney was exposed through a right lumbar incision. It was found to be firmly adherent. The pedicle was transfixed serially with chromic gut, the ureter divided and tied, and the stump cauterized. The kidney was large, with yellowish lobulations containing pus. When the pedicle was divided, thick pus escaped into the wound. After removing the kidney, remnants of the pelvis were trimmed off the pedicle and the split capsule stitched to the transversalis fascia. A single cigarette drain was introduced and the wound partially closed. The patient improved rapidly in weight and strength, and was discharged cured on August 25, 1904. The kidney was five inches long, and tubercles were found on the surface. All the pyramids contained abscess cavities.

NEPHRECTOMY FOR CALCULOUS PYELONEPHROSIS

Dr. Brown also reported the case of a colored widow, fortythree years old, who two years ago began to complain of fre ouency of micturition, pus was found in the urine There was also loss of strength, headache, and vomiting Three months ago a swelling was noticed in the right side. This proved to be an easily palpable circumscribed tumor occupying the entire right lumbar region, almost to the umbilicus The urine was cloudy and contained albumen and pus The left ureter was catheterized and gave a clear, dark, amber urine From the right ureter no urine was obtained, but no obstruction was encountered even when a long catheter was passed apparently into the kidney pelvis Upon removal of the discased kidney, it was found to contain little renal tissue. There were many large pockets of pus, and nearly all the pyramids were destroyed by intrarenal pressure A pointed calculus fitted snugly into the ureter, with branches reach ing into several of the calices The patient made an uneventful recovery

DR SAMUEL ALEXANDER said that in his experience renal tuberculosis frequently gave rise to symptoms, viz. frequent urination and pain at the end of micturition pointing to disease of the bladder and seminal vesicles, without actual involvement of those organs

DR BROWN said that frequency was a symptom probably present in 90 per cent of the cases of renal tuberculosis that had come under his observation. He thought it important for the profession at large to remember that symptoms of bladder irritability do not necessarily indicate disease of the bladder, although in the majority of cases of renal tuberculosis the corresponding ureteral papilla is hyperæmic, ædematous and more or less ulcer ated. While this condition of the ureter mouth is an additional and aggravating cause for frequency, the same symptom has been present in a few cases where this associated vesical lesion did not exist, and it would seem as if the nature of the tuberculous elements descended from the kidney gave rise to the bladder irri tability rather than any reflex innervation from the kidney

STONE IN THE PELVIC PORTION OF THE URETER.

Dr. George E. Brewer presented a man, fifty-two years old, who was referred to the speaker by Dr. Frank H. Whittemore, of New Haven. After a period of ill-health lasting about six months, the patient had an attack of renal colic on the right side. From this he recovered, but six weeks later he had another severe attack, which in passing off left a good deal of soreness persisting for several days. Examination showed a point of decided tenderness about one inch above the external abdominal ring. pation in the region of the kidney itself was negative. The patient stated that during his two attacks the pain radiated down into the groin, as in stone in the kidney. The cystoscopic examination was negative, other than the fact that the right ureteral orifice was a little prominent. Examination of the urine was negative. An X-ray examination showed a stone in the pelvic cavity, about half an inch from the spine of the ischium. A diagnosis was made of stone lodged low down in the ureter, and an operation advised. Under ether anæsthesia an eight-inch abdominal incision was made above and parallel with Poupart's ligament, dividing the various layers until the subperitoneal space was reached and the iliac vessels exposed. The ureter was followed downward. It was found moderately thickened below the brim of the pelvis, and, on account of the dense adhesions, was recognized with difficulty. No stone could be detected. An incision was then made in the ureter and a flexible sound introduced and passed downward. This was arrested at the bladder wall. After a prolonged search with the finger, a stone could be felt low down in the ureter. In order to extract it, a second incision was made in the ureter, very low in the pelvis. After removal of the stone, the two incisions in the ureter were carefully closed; the external wound united by layer suture, leaving a cigarette drain leading down behind the peritoneum. The operation, which required an hour and forty-five minutes, was not followed by any reaction, and the patient made an uneventful recovery. There had been no recurrence of his symptoms.

In reply to a question, Dr. Brewer said that, as a rule, in these operations the ureter was lifted with the peritoneum, with which it was in intimate relationship; but in this particular case it was held down by adhesions to the underlying structures. In a case

of ureteral calculus that he reported about a year ago, tenderness was elicited by rectal palpation, but that symptom was entirely absent in this case

In reply to a question as to what course he would pursue in a case where the X-ray disclosed a calculus in each urter, Dr Brewer said that he had such a case under his observation. The patient was a woman, and he advised her to drink large quantities of Poland water. She did so, and under this treatment the pain on one side had disappeared, although it was still very severe on the other. He intended to take another X-ray picture, and if this showed that one of the stones had disappeared, he would advise operating on the urter that was still occluded.

DR BROWN said that in some cases the presence of a fair sized stone or several stones in the ureter interfered very little apparently with the access of urine to the bladder, and any appreciable hydronephrosis was often absent

The speaker reported the case of a man, seventy years old, who for two years had complained of symptoms pointing to blad der involvement. There were some pyuria, frequent urination, and a bladder that was intolerant of more than one ounce of any irrigating fluid. He suffered some pain and increased irritability if driving, which had been given up on that account. Several surgeons at different times had inferred that these symptoms were due to "cystitis," "vesical calculus," "enlarged prostate".

Dr Brown's examination satisfied him that neither of the last two existed, and, suspecting ureteral calculus, had several skiaraphs made by two different experts, four of the plates were corroborative, and showed five calculi in the lowermost part of the left ureter, and two at a higher level in the right. An unsatisfac tory cystoscopy suggested a tumor referable to the left ureter, and as adjudged a prolapsus of this tube, due to the stones. This inference was supported by the fact that the row of five stones was at a decided angle with the normal direction of the ureter, and that all the stones were much nearer the median line than was the normal position of a ureter mouth.

In another case, where symptoms of ureteral calculus had persisted for fourteen years, there was no hydronephrosis. Here an X-ray-plate showed four calculi in the lower part of the left ureter.

Dr Brown was asked to catheterize the ureters, and was able

to pass the finest catheter beyond at least one, if not more, of the stones, and he injected a sterile solution. Whether because of this examination or a mere coincidence, the patient nevertheless passed all of the stones from the bladder and handed them to the expectant surgeon when about to operate two days after the ureteral catheterization.

Dr. Brewer said it must not be assumed that every shadow disclosed by the X-ray in the region of the ureter was a stone. It had been shown by Leonard that certain small shadows in this region resulted from the presence of phlebolites or calcified lymph glands.

Dr. LILIENTHAL said that in a case where the radiograph gave shadows that looked like stones, and the patient gave symptoms pointing to the presence of calculi, it was pretty safe to assume that we had to deal with calculi. In addition to the possible sources of error mentioned by Dr. Brewer, namely, phlebolites and calcified lymph nodes, there was one other that he had seen illustrated in a case of suspected ureteral calculus. The picture gave a shadow that bore a close resemblance to a calculus, but Mr. Caldwell, who took the X-ray, said he was convinced that it was not a stone, but a sesamoid bone, such as sometimes occurred in one of the obturator tendons.

SOME OBSERVATIONS ON PROSTATIC ABSCESS.

Dr. Samuel Alexander read a paper with the above title. Dr. Brown said that, in his experience, prostatic abscess was comparatively rare. He could recall, perhaps, four or five cases, and in two of those rupture had already taken place into the ischiorectal fossa.

DR. LILIENTHAL said that, in opening a prostatic abscess, he could see no advantage in opening the urethra; this, on the contrary, was rather a disadvantage, unless one had to deal with an old chronic abscess, and a fistulous opening into the urethra, where it would be advisable to curette and drain. In an ordinary acute case of prostatic abscess he favored the old-fashioned way of going in directly through the perineum into the capsule of the prostate and draining. This method was rapid and safe, no traumatism was inflicted on the urethra, and it was not necessary to pass any sounds. The speaker said he saw no serious

SOME OBSERVATIONS ON PROSTATIC ABSCESS

objection to opening the capsule of the prostate he had done this in quite a number of cases, and had never seen any harm result, and in those cases where the abscess was still intraprostatic the cure was particularly quick and thorough. The kind of incision made very little difference, excepting that the curved von Dittel incision gave better chances for drainage. Dr. Lilienthal said he had always carefully and studiously avoided opening the urethra in operating on these cases, on account of the possible danger of the formation of a permanent suppurating sac. Nowadays, no

had always carefully and studiously avoided opening the urethra in operating on these cases, on account of the possible danger of the formation of a permanent suppurating sac Nowadays, no one would open such an abscess through the rectum Dr. Alexanoer, in closing, said the reason he did not like to open an abscess of the prostate through the capsule was because in all the cases upon which he had operated, as well as in those which he had seen in other hands, there was already, at the time of operation, an opening from the urethra into the abscess, or else such an opening occurred subsequently. In the vast majority of the cases the mucous membrane of the prostatic urethra was already so much diseased that an opening was unavoidable Alexander said that the point at which he opened these abscesses was near the apex of the prostate, and in every instance he tried to make the floor of the abscess cavity absolutely flush with the floor of the urethra, and leave no pockets. The operation could usually be done within fifteen minutes. In some cases there was consider able hamorrhage, necessitating the packing of the wound, but this was exceptional, as a rule, the hæmorrhage was no more than when the opening was made through the capsule The disadvantage of opening through the capsule was, that if at the same time there was an opening into the urethra a permanent permeal fistula was more often the result As to the frequency of prostatic abscess, the speaker thought the condition was common, but often existed without being recognized. During his absence from the hospital last summer, his associate, Dr Edgerton, had operated

on at least twenty cases

Stated Meeting, November 9, 1904.

GEORGE WOOLSEY, M.D., in the Chair.

NECROSIS OF INTESTINE FOLLOWING TRAUMATISM AND LOCAL SEPTIC PERITONITIS.

Dr. John A. Hartwell presented a man of forty-five years who was admitted to the Hudson Street Hospital on June 19, 1904. He was brought to the hospital by ambulance, having been found in a stuporous condition in the street. On the following day he stated that he had been sick for three days with epigastric pain, vomiting, and constipation. He denied all history of a trauma, but as he showed marked evidences of alcoholism, this statement counted for nothing. On admission he had a temperature of 100° F.; pulse, 84; respirations, 52. The abdomen was rigid and tender, particularly in the epigastrium. Otherwise the examination revealed nothing abnormal. An operation was done a few hours later by Dr. Benjamin T. Tilton. Through a median incision below the umbilicus the peritoneum was opened, and the abdominal cavity was found to contain a large quantity of sanguinopurulent fluid. There was considerable contusion of the mesentery, with a rupture of one or two vessels, which were still bleeding. A contusion of the jejunum extending over an area of about one foot was also present, and in one or two places the external coats of the intestine were torn through, leaving the mucous coat intact. Over these exposed areas the peritoneum was brought together with Lembert sutures, the bleeding vessels in the mesentery were ligated, and the rent in the mesentery sutured. The question of resecting the gut was decided in the negative, in the hope that it would recover, and after cleansing the cavity the wound was closed, with drainage. remained intact for one week, when a fæcal fistula formed. failed to close, and the patient's poor condition precluded further operative measures at that time. He became septic, and developed a large abdominal abscess near the wound, and others in the ischiorectal region, and later in the scrotum. These were all successfully treated, and he began to gain, despite the fistula high up in the intestine

On August 7 of the present year the patient was referred to Dr Hartwell at Bellevue Hospital, through the courtesy of Dr Bolton, for the purpose of closing the fæcal fistula when his con dition would warrant it After two weeks of rectal feeding and careful attention to the abdominal wound, during which period the patient had continued to improve, an operation for closing the fistula was undertaken At this time the septic condition had entirely disappeared

The usual elliptical incision was made around the intestinal opening into the peritoneum through comparatively healthy parietes The intestine was found to be completely divided trans versely, with the proximal end projecting through the skin, and the distal end buried and occluded by a mass of adhesions inside the peritoneal cavity The two ends were freed, freshened for a short distance, and sutured by two rows of Lembert sutures In an attempt to break up the adhesions, a rupture was made in the gut about six inches below this point, and this was closed in the same manner. An examination of the intestine above the first division showed a length of about four inches, matted in adhesions, that was on the verge of complete necrosis, and the slightest handling of which produced a tear through the whole thickness of the wall. This peculiar condition had evidently existed for more than two months, that is, from shortly after the occurrence of the original injury The damaged gut was resected for a distance of five inches in the usual manner, and an end to end anastomosis made with simple Lembert sutures

The patient's further convalescence was uneventful. The bowels moved spontaneously on the third day, and there was never any discharge of fæces from the wound. He was fed entirely by rectum for four days, when diet by mouth was instituted and gradually increased. The interesting factor in the case was the failure of the intestine to either recover completely its circulation and vitality or to become gangrenous within a short time after the injury, and the associated peritomits. Neither of these conditions developed, but a progressive necrotic process en sued, which sooner or later must have ended in gangrene had the affected portion not been resected.

DR BENJAMIN T TILTON said that when the patient first

came to the Hudson Street Hospital he showed very few of the symptoms that were usually associated with injury of the abdominal viscera. He had been on a spree for two weeks, and denied all knowledge of any injury. He complained of pain in the abdomen, which he stated had come on about four days ago. The mild temperature elevation and the rapid breathing were attributed to a pleurisy, with slight effusion which was present. A rectal examination, however, revealed a mass which upon opening the abdomen proved to be due to an agglutination of the intestines. The latter were covered with lymph. Further inspection showed a contusion of the jejunum at several points and a rupture of one of the branches of the mesenteric artery, which was tied. The patient's condition at that time was so poor that an anastomosis was not deemed advisable. Perforation of the gut was feared, and subsequently it occurred, resulting in a fæcal fistula.

RUPTURE OF THE PLEURA AND LIVER.

Dr. Forbes Hawkes presented a girl, eight years old, who first came under his observation on October 5, 1903. The history obtained was that forty-three hours previous to that date the child had been run over by a wagon, one of the wheels passing over the lower part of the chest. The injury at first was not regarded as serious, for she apparently recovered from her shock shortly; but the symptoms then gradually became worse, and when Dr. Hawkes saw her the pulse was weak and rapid (120-130); she was somewhat anæmic; there was an ecchymosis over the right chest, and both recti muscles were fairly rigid. The abdomen evidently contained some fluid. There was slight dulness over lower part of right chest. A provisional diagnosis of rupture of the liver and hæmorrhage into the peritoneal cavity was made, and the abdomen was opened directly over the region of the gallbladder. The peritoneal cavity was filled with blood-clots and a brownish-green fluid, showing the presence of bile. examination revealed a rupture of the liver into which three fingers could be inserted. This wound was still bleeding, and in order to check the hæmorrhage a large dry pad was introduced and pressure exerted for about five minutes. A cigarette drain wrapped with rubber tissue was then inserted down to the wound in the liver.

The patient rallied well after the operation, but for several weeks afterwards her temperature ranged from 101° to 102° F and her pulse from 138 to 160 Then the temperature began to go still higher, and there was considerable abdominal pain, with some distention On October 16 the area of dulness over lower right chest was found to be increasing. A needle was inserted and some gelatinous like substance withdrawn About twelve hours later the chest was opened, a section of rib removed, and a small drainage tube inserted This was unfortunately removed at the end of twelve hours. The temperature, which had been up to 104° F, gradually fell, and the patient got along fairly well until October 23, when signs of sepsis became noticeable. Her temperature again became elevated, and there was considerable pain over the region of the liver The previous incision in that locality was enlarged, but the wound was found absolutely clean A second incision was made later posteriorly over the right chest, opening into a small pleural pus cavity walled off by adhesions On December 20 further sections of the ribs were removed, and counter-drainage instituted, after breaking up all adhesions in the pleural cavity Following this the temperature rose to 106° F, but soon fell to normal, and there was no further trouble Under proper exercises, the lung had since expanded, and the patient was now enjoying excellent health. She undoubtedly had a rupture of the pleura together with the rupture of the liver

BULLET WOUND OF PLEURA, LUNG DIAPHRAGM, AND LIVER.

DR HAWKES showed a bullet that had passed through a patient's pleura, lung, diaphragm, and liver, and had lodged to the inner side of the upper pole of the right kidney, carrying with it four pieces of clothing Recovery followed operation for hæmorrhage from the liver

SOME CONSIDERATIONS REGARDING WOUNDS OF THE LIVER

DR BENJAMIN T TILTON read a paper with the above title, for which see page 20

Dr. Alexander B Johnson said his experience in regard to the treatment of wounds of the liver had been very similar to

that related by Dr. Tilton. His personal experience had been limited to five operative cases, two of which he had presented to this Society. In one of the cases there was a rupture of the lung, kidney, and liver: in that instance the liver was torn away from its attachments to the diaphragm, and in order to reach the wound it was necessary to divide the suspensory ligament. This having been done, packing was introduced between the liver and diaphragm, and the liver itself was lifted upward by a mass of packing underneath. The patient, a child, recovered. In another case of rupture of the liver resulting from a run-over accident in a man, the diagnosis was made of shock due to an internal injury. In this case the rupture extended to the posterior border of the lower surface of the liver, and it was impossible to stop the hæmorrhage by packing, and the patient bled to death. In a similar case, Dr. Johnson said, he would be inclined to crowd in a large mass of packing in front of the liver, after first cutting the suspensory ligament. By this method the hæmorrhage might possibly have been checked. Incised wounds of the liver, the speaker said, where they could be reached, could usually be successfully treated by suture. In another case coming under his observation there was a rupture of the superior surface of the liver: a chronic peritonitis resulted with the formation of adhesions between the anterior border of the liver and the abdominal wall, giving rise to considerable exudate of bloody serum and liver tissue. The diagnosis was made of probable abscess of the liver on account of the apparent increase in the size of the organ. The drainage of the cavity resulted in recovery.

Dr. George E. Brewer referred to two cases of severe visceral lesions resulting from abdominal contusions in which there were very slight evidences of shock. In one case of complete rupture of the spleen the man was able to walk two miles after receiving his injury. In another case, that of a railroad man who was caught between the buffers of two cars and sustained a rupture of the right lobe of the liver, the early symptoms were very slight. Dr. Brewer said he cited these two cases because Dr. Tilton had made the statement that in those instances where the symptoms of grave shock were absent, the treatment should be expectant. Severe intra-abdominal hæmorrhage not infrequently occurs with very slight symptoms of shock in the early stage.

In regard to the possibility of remote consequences from injuries of the liver, Dr Brewer said his attention had recently been called to an article by Kehr, in which the writer described a condition of hepatic apoplexy, a hæmatoma of the liver substance from apparently slight mury This hæmatoma might become absorbed, or it might become infected and give rise to an abscess which might develop very rapidly and produce marked symptoms of sensis. Last spring, Dr. Brewer said, he was called to operate in a case of supposed acute intestinal obstruction. The patient had had a sudden rise of temperature, with tympanites, pain, muscular rigidity, vomiting, and obstinate constipation A gradu ally increasing area of hepatic dulness was found, into which a needle was finally introduced through the back, and a syringeful of chocolate-colored fluid withdrawn This was found to be com posed of blood and pus Subsequently, a rib was resected, and on going down through the diaphragm into the liver an abscess was reached and a pint of dark-colored pus evacuated From this patient the history was afterwards obtained that three months before she had been thrown from her horse, striking on her right side It was probably one of those cases where a hæmorrhage into the liver substance had become infected

DR OTTO G T KILIANI said he had seen two cases of wounds of the liver in which he had met with great difficulty in checking the hiemorrhage. He referred to an apparatus for stopping the bleeding in these cases by means of hot air or steam

DR GEORGE WOOLSEY said he agreed with Dr Brewer that very slight evidences of shock were sometimes observed in cases of severe visceral injury, and that exploratory operation was indicated in case there was any serious suspicion of such injury. In cases of injury of the liver he had found packing effective in stopping the harmorrhage. He mentioned a case of injury of the liver in a four-year-old child that had been run over. Examination showed a deep and narrow wound of the liver near the transverse fissure. There was a great deal of hæmorrhage into the abdominal cavity. On picking up what seemed to be a ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel, it proved to be the common ble duct completely ruptured vessel.

the stools gradually became paler, until they were clay-colored. By the end of the second week, as the patient was evidently losing ground, and a second operation was undertaken, cholecystenter-ostomy was performed, but the attempt to find and tie off the duct had to be given up on account of the adhesions and the poor condition of the patient. The patient died within twenty-four hours after the second operation. Such an injury is very unusual, and no case has been met with in medical literature where a primary radical operation has been done in such a case. As a result of his experience, Dr. Woolsey is convinced that the preferable procedure in such a case would be cholecystenterostomy with ligature of both ends of the ruptured duct.

Dr. Tilton, in closing, said he agreed with Drs. Brewer and Woolsey that severe visceral injuries might be present without giving rise to early severe symptoms. Even these cases could usually, however, be recognized by the presence of some local symptom or by some subsequent development. Unless distinct evidences of injury could be made out, the speaker said he was inclined to wait before operating until dulness indicated the presence of blood, or until the onset of other symptoms rendered a laparotomy advisable. Of course, in the presence of marked symptoms at the outset, an operation should be done as soon as possible.

TRANSACTIONS

OF TH

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, October 3, 1904

The President, HENRY R WHARTON, MD, in the Chair

LARGE MULTILOCULAR OVARIAN CYST, OPERATION THROMBOSIS OF THE RIGHT PULMONARY ARTERY DEATH

DR ROBERT G LE CONTE reported the case of a woman, aged sixty four years, who was admitted to the wards of the Pennsyl vania Hospital December 21, 1902, under the care of Dr Scott. with an abdomen enormously distended, dome-shaped, and very tense From the umbilious upward the superficial veins promi nent, but no cedema of the skin. From umbilicus downward no yeins visible, skin quite ædematous, pitting on pressure. The entire abdomen from the ensiform cartilage down was dull over the anterior aspect but above the iliac crests and in the flanks there was a high pitched tympamtic note. Distinct succussion Both legs very cedematous, the left a little more so than the right, with great dilatation of the smaller veins and capillaries. giving the legs a rosy appearance. Urine, amber, cloudy, brownish precipitate, acid, specific gravity 1010, marked amount of albumen, no sugar, quantities of pus and epithelial cells, hvaline casts, and a few small granular casts Blood hæmoglobin, 88 per cent, white blood corpuscles, 16,200

A trocar and cannula were introduced two inches below the umbilicus in the median line, no fluid was withdrawn, but after the cannula was removed a small amount of gelatinous material exuded from the wound. The trocar was again introduced at

another position in the median line with the same result. The next day a three and one-half-inch trocar was introduced to the hilt, and again failed to draw any fluid, although a gelatinous material exuded on its removal.

December 27 the abdomen was opened in the median line. An ovarian cyst immediately presented, which filled the entire abdominal cavity, and was adherent to the parietal peritoneum, liver, spleen, intestine, etc. It showed three trocar openings from which gelatinous material was exuding. Quite a large quantity of this material was found free in the peritoneal cavity, the cyst not being adherent in the region of the trocar openings. The cyst was opened, and as much of this yellowish, gelatinous material scooped out as possible; the adhesions to the surrounding organs broken up, the pedicle ligated, and the cyst removed. Several quarts of the gelatinous material were then removed from the peritoneal cavity, but, as all the organs within the abdomen were thickly coated with it, its stickiness made it impossible to remove it all, and quite a large amount was allowed to remain. The incision was closed without drainage. The total weight of the material removed, together with the cyst wall, was estimated at about sixty pounds. The patient's condition during operation was at times very poor, but she seemed better at the close of the operation than at the beginning. Reaction was good, and for several hours her condition was quite good; pulse slow and of good volume; respirations normal. At II P.M., without any prodromal symptoms, she suddenly became very restless, gasping for air, with failure of the pulse, and death ensued in a few moments.

The pathological report of the specimen showed it to be a multilocular ovarian cyst, with locules ranging from the size of a hickory-nut to the enormous one which was opened at operation. The contents of the tumor were for the most part a clear, yellowish, sticky, jelly-like substance, with occasional streaks of pure white, and again in small areas portions which were blood-stained.

A post-mortem examination was made fourteen hours after death, in which the findings were briefly as follows: Thrombosis of the right pulmonary vessels; general arterial sclerosis; general old adhesive peritonitis; broncho-pneumonia; chronic endocarditis; cirrhosis of the liver; chronic perihepatitis; diffuse nephritis; perisplenitis, etc.

On section all the lobes of the right lung have a dry, pinkish-

gray surface The vessels are filled with a firm, mostly red laminated clot, which is adherent to the vessel walls in places, but which can be detached and removed as a tree. The descending aorta is the seat of several thickened patches of selerosis, from one to three centimetres in size. That vessel and the iliac arteries are free from clots. The heart contained fluid blood and no clots

ACUTE APPENDICITIS, OPERATION, SEPTIC THROMBO SIS OF A BRANCH OF THE RIGHT PULMONARY ARTERY, FOLLOWED BY ABSCESS OR GANGRENE OF THE LUNG, DEATH

DR. LE CONTE also reported the following case A man, aged fifty four years, was admitted to the Pennsylvania Hospital, September 15, 1903, who had been ill for five days with abdominal pain, vomiting, fever, constipation, the pain localizing itself in the right iliac region during the last forty-eight hours. No previous attack of this nature On admission his temperature was 102½° F, pulse, 120, respirations, 32 Abdomen prominent, rigid, and tender only in right thac region, where an illy defined sausage shaped mass could be made out on palpation

The abdomen was opened through the right rectus muscle, exposing an appendix very large, much thickened, inflamed, red, and standing erect Meso-appendix very thick and board-like No perforation was visible in the appendix, but on one side there was a greenish spot It contained pus and a fæcal concretion the size of a chestnut Intestines in the immediate neighborhood were in places of a gray-green color, like beginning gangrene. The appendix was removed, the surrounding abdominal cavity walled off from the green portions of the intestine, drainage inserted, and the abdominal wound partially closed Bacterial cultures from the peritoneum showed bacillus lactis aerogenes Reaction following the operation was good, and the convalescence seemed to be well established, when on September 25, ten days after the operation, he wakened from sleep in a condition of profound col lapse The weakness was extreme, pulse very feeble, breathing difficult and shallow, temperature one degree subnormal, sweat ing profuse No pain Later in the morning there was severe pain beneath the right scapula. No impairment of resonance, no friction sound or rales to be heard

September 26. There was suppression of the breath sounds over the base of the right lung posteriorly. No impairment of resonance; no friction murmur. Temperature had risen to 103° F.; some cough; no expectoration.

September 27. Resonance impaired over right base, where the breath sounds were very feeble. Cough continues with some bright, blood-red expectoration. Leucocyte count, 16,000; pain shooting through lower part of right chest.

September 28. Physical signs over right base similar to those of a central pneumonia. Expectoration more free and still bright red. Pneumococcus and tubercle bacillus not found in sputum. Patient continued in this condition for about a week, and then a slow improvement set in, although the temperature never quite reached normal.

By the 19th of October a small, localized effusion was diagnosed over the right pleura. The sputum at this time was very copious, had lost its bloody characteristics, but was occasionally rusty. It was filled with pneumococci; breath a little offensive. Patient moderately septic with hectic temperature.

October 27. During a hard coughing spell a large quantity of foul-smelling, tenacious, yellowish material was brought up. An exploring needle was inserted into the chest and about a drachm of dark brown, thin fluid was evacuated, with a fæcal odor. This fluid was loaded with streptococci and staphylococci, and with bacilli which were variously described as long and thin, short and stout, and square-ended.

October 28. Under local anæsthesia, induced by Schleich's fluid, an attempt was made to open the chest. The pleura was opened and no fluid encountered. The lung within felt hard and solid. This procedure was so painful and depressing to the patient that the operation was not persisted in. His condition at the time was profoundly septic, and it was not deemed advisable to give an anæsthetic. Owing to difficulty of respiration, he was constantly in a semirecumbent position, could not lie down.

November I. He was again tapped and purulent fluid of a very foul odor withdrawn. He positively refused any further operative procedures, and it was not until November 5 that he consented. At this time, while in a semisitting position anæsthol was administered. After he became unconscious, it was found impossible to operate with the patient in this position, and it became nec-

essary to turn him on his left side
Just as the skin was incised there was a violent expulsive cough, and from the mouth and nostrils a quantity of feetid, greenish pus gushed out In a second, respiration cased and stimulation and artificial respiration failed to revive the patient
Evidently the lungs were flooded with pus by the rupture of the abscess, and he was drowned in his own secretions

Post mortem examination was refused

Dr Le Conte said that his reasons for believing this case to be one of septic embolus of a branch of the right pulmonary artery were the following

Suddenness of onset with collapse, difficult respiration, feeble pulse, an absolute lack of physical signs at first, these de veloping in the following order, pain, impaired breath sounds, fever, bright bloody expectoration, impaired resonance, at first no rales and no friction murmurs. With the meso-appendix enormously thickneed and inflamed at the time of operation, it is not hard to believe that a septic clot detached itself from one of these vessels and was swept into the lower branch of the right pulmonary artery.

DR GEORGE ERETY SHOEMAKER regarded the class of cases operation might be due to sudden heart failure One peculiarity about cases of sudden death is that nearly all of them occur from a week to ten days after operation and in patients that are doing well, hence they come as a surprise Such patients move about more than do those profoundly ill Emboli are thus formed out of otherwise innocent local vein clots They should teach the surgeon that it is unwise, even in simple cases of major operation, to allow the patient out of bed as early as the tenth day Some surgeons even boast of their patients leaving the hospital on the tenth or even the fourth day, this adds to the risk These remarks do not, of course, refer to Dr Le Conte's cases Dr Shoemaker's experience with embolism is limited to one case which occurred after severe hamorrhage due to ruptured extra-uterine pregnancy The patient was a large woman, who had a fatty heart and had occurred during the sixth week of gestation After operation the pulse and temperature were normal at the ninth day, and the

patient was supposed to be in splendid condition. She died instantly, no doubt as the result of a clot in the pulmonary vessels, though no post-mortem was held. Most of the cases in which embolism occurs are simple in character, and for that reason the surgeon is apt to allow the patient early liberty. A similar variety of sudden death occurs after undue exertion during pneumonia.

Dr. Henry R. Wharton mentioned a case in which he performed Schede's operation for varicose veins of the leg. The patient recovered from the anæsthetic, but in five hours developed shortness of breath and soon died. There was in this case some question as to whether there was pulmonary or cardiac embolism, as no post-mortem examination was made.

Dr. Le Conte added that cases of pulmonary embolus might be divided into two groups, the septic and the non-septic; and these again into large emboli and small ones. In some cases where the embolus is aseptic and small, one of the smaller branches of the pulmonary artery may alone be occluded, and the patient may present symptoms not dissimilar to syncope. There will be a rapid, feeble pulse, shallow respiration, sweating, and usually pain in the lung. Such cases almost invariably recover, the attending surgeon perhaps having entirely overlooked the fact that embolus has taken place. In other instances the non-septic thrombus may be so large that the entire pulmonary artery is occluded, and death is almost instantaneous.

In the septic group, if the primary thrombus is small and only a portion of the artery is occluded, the patient recovers from the immediate shock, to develop later a septic pneumonia or gangrene of the lung. In such cases, then, the patient does not die as a result of the occlusion of the vessel, but rather on account of the septic material which has been deposited in the lung.

COMPLETE INTESTINAL OBSTRUCTION FROM A BAND AND VOLVULUS OF THE ILEUM.

DR. ROBERT G. LE CONTE reported the case of a man, aged forty years, who was admitted to the Pennsylvania Hospital, July 18, 1904, with a history of four attacks of appendicitis since June, 1903, culminating in an attack in April, 1904, when a large abscess in the region of the appendix was opened, but without the removal of the appendix.

On July 14, 1904, he was again seized with nausea, vomiting, and great abdominal pain. There was great prostration. His bowels moved slightly the next day and again on the morning of admission, July 18. Vomiting was more or less constant and was of a greenish hue, but not until the evening of the 17th was there any offensive odor from the vomitis. On admission the patient was pale and haggard looking, very thin, voniting of a projectile type, every half or three quarters of an hoir, material that was thin and stercoraceous. The abdomen was distended, rigid, universally tender, but most markedly so between the scar of the former operation and the umbilicus. Pulse weak and small, temperature normal. Diagnosis, obstruction from a band of adhesion

The patient was immediately etherized and a four inch incision made in the median line between the umbilicus and the pubes The small intestine was found very much distended with numerous adhesions, the bowel being firmly adherent to the cicatrix of the previous operation. After breaking up some of the adhesions, a firm band was found compressing about three feet of the lower ileum, and this portion of the gut had taken one twist to the right While breaking through this band and further separat ing the adherent gut from the abdominal wall the friable bowel Through this perforation the haund contents of the bowel were evacuated, the rent was then sewn up and the abdomen flushed with warm sterile salt solution and closed without dramage The patient's condition was so precarious that no attempt was made to find the head of the colon or to explore the appendiceal region As the abdomen was being closed, an assist ant passed a stomach tube and washed out the stomach, removing in the neighborhood of a quart of stercoraceous material Reac tion following the operation was slow, but there was no further vomiting and the sensation of nausea gradually disappeared, the pulse improved in volume and strength. Five days after operation the patient again complained of severe pain in the old appendiceal scar The temperature, which had been normal, rose to 101° F Inspection of the abdomen showed that there was bulg ing over the lower portion of the old scar, with exquisite tenderness and redness of the skin. An incision was made into this and several ounces of grumous, grayish, foul-smelling material was evacuated A rubber tube was inserted for drainage. This ma terial was reported by the pathologist to be more or less structureless and without leucocytes, resembling in its characteristics fæcal material. The temperature immediately fell to normal, the pain disappeared, and there was no further discharge from the cicatrix. The convalescence from this time was uneventful, the median incision healing by primary union, and the cavity in the old scar by granulation. The patient was walking about by August 25, and was discharged from the hospital on the 29th of August in good condition with both cicatrices sound.

Dr. John B. Roberts had operated upon a similar case. The patient had had his appendix removed, and a short time later obstruction necessitated a second operation. One year later, when again suffering from obstruction, he came under the care of Dr. Roberts. Operation revealed a dense matting together of all the structures in the right iliac fossa. The intestine was kinked, a loop having passed beneath a constricting band and produced an intestinal hernia. The loop was drawn out of its bed and the patient recovered.

Dr. De Forest Willard had met with several cases of obstruction following operation for appendicitis, the obstruction developing from ten days to three weeks after operation, during healing of the wound. On three occasions Dr. Willard had opened the abdomen and found cicatricial bands. In one there were two bands, one inch apart, the division of which gave the desired relief. In the second, two feet of the intestines were shut off, requiring resection; the patient recovered. In the third case, adhesions were more extensive, and in freeing them the bowel was ruptured; this patient died on the second day. In a case of inflamed ovarian cyst followed by appendicitis and obstruction after operation the intestines were found so adherent that it was impossible to separate them. Death ensued. Considering the frequency of general peritonitis, it is a wonder that obstruction does not more often follow appendicitis operations.

DR. LE CONTE said, in closing, that when a constricting band alone is present the condition is a comparatively simple one to deal with. The lumen of the intestine is cut off, but the circulation in the constricted portion is not materially interfered with. When, however, volvulus occurs, the blood supply to the intestine is cut off in the mesentery, and thrombosis of the veins will take place if the condition exists for any length of time. Thrombosis of the mesenteric veins necessitates intestinal resection, and death will

follow in the majority of cases, as the patient's condition is usually so bad that a prolonged operative procedure cannot be safely undertaken. Of six or seven cases of volvulus personally seem by the reporter, the case reported this evening was the only one saved. It is difficult to understand how volvulus occurs when the intestine is free, but the mechanism is more simple when a portion of the gut is adherent, for we can readily understand how violent peristaltic movement, when suddenly checked by an adhesion, might throw a loop of intestine around this adhesion. The recorder's opinion was that in the case reported this evening the band had probably lasted for several days, gradually constricting the intestinal lumen, but that the volvulus had perhaps been present only a few hours, as there was no evidence of the formation of clot in the mesentery veins

OSTEOMA OF THE ORBIT

DR WILLIAM J TAYLOR presented a bony growth removed from the left orbit of a boy of sixteen

The operation was done at St Agnes's Hospital on December 21, 1903

The boy had been under observation and treatment at the Eye Department under Dr Shoot and Dr Perkins, who have a very elaborate history of his ocular conditions A careful X-ray study was made also of his head, as he desires to make a more detailed report of this case in the future The left eyeball was pushed forward, downward, and outward by a mass growing in the orbit The boy's mental condition was gradually becoming cloudy, he was irritable, his whole disposition had changed, and he was totally unlike his former self. There were, however, no definite symptoms which could localize any growth in the brain, nor had there been any palses other than the difficulty with the ocular muscles, which seemed to be directly due to local pressure

An incision was made along the upper border of the eyebrow, exposing a hard bony mass, which seemed to fill the whole of the orbit. The edge of the orbital ridge was thinned out and blended in with the outline of this irregular mass of bone, which was so hard and dense, that a chisel or gouge could make no impression upon it whatever. It was, therefore, necessary to cut away the whole of the orbital ridge, and in so doing the frontal sinus was opened, from which a large quantity of glarry material exuded

It was now found that from pressure the whole of the upper wall of the orbit had been obliterated, and the bony mass extended through the nasal cavity and into the right frontal sinus. After a good deal of difficulty, and the cutting away of a large portion of the overlying bone, it was possible to remove the mass, which is of irregular shape, and measures two and three-fourths inches by two inches. It was very dense and entirely unattached, for it remained simply in place, held by overlapping bone. Its removal left an enormous cavity and the exposure of a large area of the dura; as the pressure had entirely destroyed the borders of the orbit, there was no evidence of disease of the bone, simply erosion from pressure.

He stood the shock of the operation very well, but the wound became infected from the nasal cavities, which were exposed, and death occurred in a week from septic meningitis.

DR. DE FOREST WILLARD mentioned the case of a woman operated upon some years ago for osteosarcoma of the nose and orbit. He removed the lachrymal, nasal, ethmoid, and vomer, and even then stopped short of the full extent of the growth. The patient died eight days later of septic meningitis. The tumor probably sprung from the ethmoid. The eye was not displaced.

REVIEWS OF BOOKS.

Von Bergmann's Surgery A System of Practical Surgery By
Drs E von Bergmann, of Berlin, P von Bruns, of Tübingen, and J von Mikulicz, of Breslau Edited by William
T Bull, M D., Professor of Surgery in the College of Physicians and Surgeons (Columbia University), New York
Volumes IV and V Philadelphia and New York Lea
Brothers & Co., 1904

The previous volumes of this system of surgery have been reviewed in the Annals of Surgery

Volume IV contains more of interest and importance than any of the other three volumes which have preceded it. Treat ing, as it does, of the surgical diseases of the alimentary tract, including herma, it presents the views and teachings of some of the foremost surgical minds of Europe. One has but to note the authors of the various chapters to appreciate the worth of the outline. Malformations, Injuries and Diseases of the Œsophagus by v. Hacker and Lothessen, those of the Stomach and Intestines by v. Mikulicz and Krausch, Injuries and Diseases of the Laver and Bilary Passages by Kehr, of the Pancreas by Korte, of Herma by Graser, and Laparotomy by v. Mikulicz and Krausch.

Probably the most interesting chapters are those by v Mikulicz and Professor Kehr, although the contributions of the others are by no means inferior. It is also to be noted that in this volume the names of the authors of the various chapters are given, an omission which somewhat detracted from the value of Volume II.

The translators have chosen a very pleasing method of pre-

senting the text of the various authors, eliminating the ego, and emphasizing the name of the author.

In the American edition the more important illustrations of our own authors have been freely drawn upon. Those of Huntington, Mayo, Finney, Stimson, Senn, Richardson, and others are found. The illustrations of gastrostomy are very good, and here, as in many other places, do away with a complicated description of the various operations for the same, whereby the meaning is made plain without much mental effort.

Volume V treats of the Surgery of the Pelvis and Genitourinary Organs. Malformation, Injuries and Diseases of the Pelvis come from the pen of Steinthal; of the Urethra and Penis by Körte and Rammstedt; of the Kidneys and Ureter by Schede; of the Bladder and Prostate by Nitze and Sonnenburg; of the Scrotum, Testicles, etc., by v. Bramann.

The chapter on Diseases of the Prostate is not up to the standard of the other chapters by the same authors. This is probably due to the fact that the original was published before the recent advances in this branch of surgery took place. It is also indicative of the fact that the German surgeons have not been the pioneers in this work.

Volume V contains, in addition to its own special index, a general index. There is no section of the work devoted to Gynæcology.

The translators are to be congratulated upon the success of their work, which has been accomplished so well.

The value of the work has increased with each volume, and completed forms a system not alone valuable to the student, but of encyclopædic interest to the specialist. Here are to be found in a comparatively small space the opinions of the leading German surgical authorities concisely and carefully stated, and revised and edited by an American surgeon whose judgment and experience have greatly increased the value of the original work.

Paul Monroe Pilcher.

LES TUMEURS MALIONES PRIMITIVES DE L'INTESTIN GRÊLE
(JEJUNO-ILEON) Par le DOCTEUR P LECÈNE, Interne
Laureat des Hopitaux de Paris, Prix Giriale (1903),
Medaille d'Or (1904), Prosecteur a la Faculte, Membre de la
Societe Anatomique Paris G Steinheil, Editcur, 2, Rue
Casimir-Delavigne, 1904

In this brochure we have the first efforts of the French school of medicine to throw light on this subject, to which our American conferers, judging from the repeated use of their names, have taken the initiative and contributed liberally

The first half of the book covers a description of the sarcomata The second half embraces an account of the carcinomata

The sarcomata may be of any variety, are associated with metastases of the mesenteric lymph glands and all the other organs of the abdomen and thorax and the marrow of the long ones. The favorite seat of this disease is in the sleum, and the males are represented as being afflicted twice as often as the females. The seventy six cases described show the disease to be most common between the ages of twenty to thirty, yet there are thritten instances reported of its occurrence in infants, and even one case in the newborn

The symptoms are not well defined, yet a most striking symptom is the absence of any intestinal obstruction, accounted for by a dilatation of the bowel at the site of disease, accompanied by ganglionic enlargements, which have been the findings at post morten. Among other symptoms are constipation alternating with diarrhea, colicky pains, a cachexia appearing very early and remarkably rapid in its progress.

Death ensued in 89 per cent of the cases from acute intestinal obstruction or perforative peritoritis Only once has the correct diagnosis been made, and but two of the cases operated were free from recurrence many years later

Epithelioma of the small intestine, on the other hand, is more frequent in the advanced years The growth is small and difficult

to palpate. Pathologically, it is of cylindrical type and takes its origin in the follicles of Lieberkühn.

In 44 per cent. of the cases epithelioma was multiple. This fact, together with symptoms of complete obstruction, help to differentiate it from carcinoma. Pains are very marked in epithelioma and cachexia.

The progress of epithelioma is very much slower than that of sarcoma. In a child of three years afflicted with epithelioma the disease lasted two months; others survived the disease two years.

The diagnosis of epithelioma is even more difficult than that of sarcoma. Of the six cases but one was cured and no recurrence took place. On this subject, too, Americans have contributed the greater share.

The remainder of the book gives a detailed account of the original publications which are the basis of the monograph. There is but one illustration and several statistical tables.

MARTIN W. WARE.

INTERNATIONAL CLINICS. Edited by A. O. J. KELLY, A.M., M.D. Volumes II and III. Philadelphia: J. B. Lippincott Company, 1904.

Both of these volumes contain much of surgical interest. This publication is so well and widely known that a general description of the character of its contents is not necessary. The first of these two volumes contains a symposium upon tropical diseases. Liver abscess is presented in an excellent article on that subject by Dr. James Cantlie. He divides these cases under the heads of suprahepatic abscess, intrahepatic abscess, and subhepatic abscess. The second of these varieties, he says, is usually due to dysentery, and the presumption is in favor of an embolus, carried to the liver substance by way of the portal vein. This belief is supported by the fact that an ulcerated surface in the colon is usually found to be the starting-point of a phlebitis. Further-

more, these abscesses are apt to be triangular or wedge shaped, with the apex towards the gate of the liver. The best treatment is the earliest possible evacuation of the pus. The diagnosis should be confirmed and the abscess located by the aspirating needle, and this followed by the introduction of the trocar and cannula, carrying a rubber drainage tube to be left in situ. This should be done before the abscess has reached the surface. The author in sists that when a cutting operation for abscess of the liver becomes necessary, operation has been put off too long, and the very fact that the operation has been performed (however successfully) is condemnatory, as it points to lack of diagnostic skill or to delay in reaching the pus while it was as yet deeply seated. The author has operated upon fifty three cases by the use of the trocar and drainage tube.

Another article of value is by Mr James Edwin Thompson on the diagnosis and treatment of abscess of the liver, based upon an observation of twenty one patients suffering with abscess of the liver. These cases occurred in Texas. Fifteen had a previous history of dysenters. Nine died and six recovered. Autopsies on six of the fatal cases showed lesions in the colon in four cases The author lays down a group of characteristic symptoms These are a history of dysentery, a general feeling of malaise, elevated temperature, a vellow, sallow appearance of the skin, at times approaching to jaundice, pain in the hepatic region, or over the shoulder blade, or at the acromion process, or at all three places. enlargement of the liver, upward downward, or in both direc tions, tenderness over the liver, bulging of the intercostal spaces, cedema over the lower costal zone, and irritating, spasmodic cough Rarely are all of these symptoms present in the same case, but most of them will be found in advanced cases

A chapter on ankylosed joints and their non-operative treatment is contributed by Dr J Torrance Rugh This is fully illustrated Another paper worthy of note is by Mr E Stammore Bishop on abdominopelvuc diagnosis A most excellent paper on

intestinal obstruction in children is by Dr. Charles Greene Cumston; and another on injuries of the kidney by Dr. Miles F. Porter.

Volume III contains a symposium of articles on syphilis. The section on surgery contains a noteworthy paper by Dr. Thomas H. Manley on umbilical hernia in the female, with the report of three cases of the strangulated variety. The first two of these cases died after operation, the third recovered, and serves to illustrate the application of the best judgment and wisest surgical methods that can be applied to this serious condition. In a chapter on foreign bodies in the bronchi, Drs. Lermoyez and Guisez report two cases. One case was that of a prune stone in a bronchus and the other was that of an upholsterer's nail. The first died; the second was saved by the introduction of a bronchoscope through an opening in the trachea, the location of the nail and its extraction by means of an electromagnet. Dr. Charles Greene Cumston presents an article on the pathology and operative treatment of acute osteomyelitis and osteosarcoma.

Many of these articles are in the form of clinical lectures, and bring the reader into the atmosphere of the clinic. Medicine, surgery, and their special divisions all receive consideration. The work is especially valuable to the practitioner. It is really a postgraduate course in medicine.

JAMES P. WARBASSE.

CORRESPONDENCE.

THE OPERATIVE TREATMENT OF CANCER OF THE BREAST

EDITOR OF ANNALS OF SURGERY

In his exhaustive and carefully prepared article on "The Operative Treatment of Cancer of the Breast," which appeared in the issue of the Annals of Surgery for December, 1904, Dr J Collins Warren, of Boston, says as follows "In the greater portion of the second series the method known as the Halsted operation was consecutiously followed Latterly, however, 11, during the past year, I have adopted the method given below, and find it one that I can recommend as both safe and thorough, etc."

The operation described by Dr Warren, as adopted within the last year, is in every essential the operation which I published in the New York Medical Record of December 15, 1894, in a paper which was read before the Section on Surgery of the New York Academy on November 12, 1894

Though cognizant of the merits of Halsted's operation, I have always within the last ten years emphasized my conviction that my operation, which was published simultaneously, but enterly independently, from that of Halsted, could be claimed to be the more anatomical one. And this for the reason that the operator works from the axilla towards the thorax, from the tendons towards the origin of the pectoral muscles in an almost bloodless way. Almost bloodless, because he can thus secure the vessels at their exit and entrance from and to the axillary and subclavian vessels.

Since 1894 I have taken occasion to discuss my method whenever presenting patients thus operated upon before various societies, in particular before the New York Surgical Society, the Transactions of which are published in the Annals of Surgery (cf. also Charles N. Dowd, "A Study of Twenty-nine Cases of Cancer of the Breast submitted to Operation," Annals of Surgery, 1898, Vol. xxvii, page 285).

For the last meeting of the American Medical Association (Atlantic City, June, 1904), I had announced a paper, "Ten Years' Experience with My Radical Operation for Carcinoma of the Breast." The title appeared in the provisional programme. To my sincere regret, I had to forego the pleasure of reading it for special reasons. It was due to the courtesy of the Chairman of the Section on Surgery, Dr. Charles A. Powers, that I could briefly outline my operation, as I am carrying it out to-day. In introducing my remarks I said that I had hoped to discuss Dr. Warren's paper on carcinoma of the breast, the title of which appeared on the official programme. Unfortunately, Dr. Warren's paper was not read. (cf. Journal of the American Medical Association, Report of June 25, 1904.)

Since then I have read my article, previously announced, before the meeting of the New York State Medical Association, October 18, 1904, and before the Section on Surgery of the New York Academy of Medicine, November 4, 1904, showing every step of the operation in drawings, reproduced from photographs of dissections on the cadaver.

I can only account for the omission of my name in connection with the operation now described by Dr. Warren on the ground that he did not append any bibliography in his article. The evolution of this operation I have demonstrated to many American and European colleagues in my hospital and private work in the course of the last ten years.

WILLY MEYER, M.D.

DECEMBER 20, 1904.

Awarded
GOLD MEDAL
Louisiana
Purchase
Faposition

LISTERINE.

Awarded

GOLO MEDAL

Longana
Purchise
Expesition

A non toxic antiseptic of known and definite power prepared in a form convenient for immediate use of ready dilution, sightly, pleasant and sufficiently power ful for all purposes of asepsis these are advantages which Listerine embodies

The success of Listerine is based upon merit and the best advertisement of Listerine is—Listerine

LISTERINE DERMATIC SOAP

An antiseptic detergent for use in the antiseptic ireatment of diseases of the skin.

I isterine 'Dermatic Soap contains the essential antiseptite constituents of eucalyptis (1) mentha, gauliheria and thyme (each 1.), which enter into the composition of the well-known antiseptic preparation, I isterine, while the quility of excellence of the soap stockenployed as the vehicle for this medication will be readily apparent when used upon the most delicite skin and upon the scalp I isterine 'Dermatic' Soap contains no animal fats, and none but the very best vegetable oils, after its manufacture, and before it is 'milled' and pressed into cakes, a high percentage of an emolhent oil is incorporated with the soap, and the smooth, elastic condition of the skin secured by using I sterine 'Dermatic Soap as largely due to the presence of this ingredient. Unusual care is exercised in the preparation of I isterine are added to the soap after it has received its surplus of unsuponified emollent oil, they retain their peculiar antiseptic virtues and fragrance

A sample of Listerine Dermatic Soap may be had upon application to the Manufacturers—

Awarded
GOLO MEDAL
Louisiana
Purchase
Exposition

Lambert Pharmacal Company, St. Louis, V. S. A.

Awarded
GOLD MEDAL
Lemstana
Purchase
Exposition

Cattell

First edition exhausted in six months Second revised and enlarged edition

Almost Ready

Post-Mortem Pathology

By HENRY W. CATTELL, A.M., M.D.

Sometime Director of the Josephine M. Ayer Clinical Laboratory of the Pennsylvania Hospital; Pathologist to the Philadelphia Hospital; Senior Coroner's Physician of Philadelphia; Pathologist to the Presbyterian Hospital; Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania.

Octavo. 464 pages. 183 illustrations. Cloth, \$3.00.

R. CATTELL, whose name is already well known to our readers as one of the editors of the English translation of Ziegler's work on General and Special Pathology, has in 'Post-Mortem Pathology' written an excellent guide to the proper carrying out of post-mortem examina-This volume will prove to be a most useful reference book on matters connected with every branch of the subject; where description fails to convey the meaning of some manipulations, excellent illustrations make matters quite There is no doubt that many practitioners feel the want of some such aid, for in the past we fear our own curriculum of medical education has been defective in not insisting upon closer attention to such matters. To English as well as American readers this volume will be of service in this direction, and considerable help will be found in the chapter dealing with difficult questions of medicolegal character. Dr. Cattell's great experience in pathological inquiries gives him the right to produce a work of this kind, and, as might be surmised, there is little room for criticism of the statements made, though the reader may disagree with some of the methods recommended—as, per example, the method of opening the skull-such differences are of minor importance. After discussing the choice of instruments and the design of post-mortem rooms and refrigerator apparatus, the account is given of the various pathological appearances met with in various systems in different diseases. Special guidance will be found for the examination of children, and for what are called restricted post-mortem examinations.

"Harkes's method for securing a view of the nasopharnyx by median section of the skull after the calvarium has been removed is described, and a useful account is given of the methods to be adopted for preserving bodies for subsequent examinations and embalming. Amongst other general information will be found an account of the methods to be adopted to fix permanently the colors of the tissues in museum specimens (Kaiserling), of the early diagnosis of rabies by the method—elaborated by Babes, Van Gehuchten, and Nelis, and of Uhlenhuth's precipitin test for human blood. The volume closes with a useful analysis of the various modes of death which occur in different diseases."—
British Medical Journal, October 15, 1904.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

Almost Ready Spalteholz and Barker

Atlas of Human Anatomy

B) WERNER SPALTEHOLZ

Extraordinary Professor of Anatomy in the University and Custodian of the

EDITED AND TRANSLATED FROM THE THIRD CERMAN EDITION B. LEWFLLIS F BARKEP MB. Tor

Profesor of Anatomy University of Chicago WITH A PREFACE

By FRANKLIN P MALL

Professor of Anatomy in the Johns Hot kins University Raltimore

872 pages 935 illustrations, mostly in colors 3 volumes Cloth \$10 00 per set

OR convenience this atlas is divided into three volumes

I -BONES JOINTS LIGAMENTS

VOL. II - RECIONS, MUSCLES PASCIE, HEART, BLOOD VESSELS VOI III -VISCERA, BRAIN, NERVES, SENSE ORGANS

Pictures of dissections, true to nature aid the imagination refresh the memory, and act as an excellent guide in the practical worl of the physician and surgeon. In this atlas the illustrations are typical and give all the stages of a dissection of a body from its beginning to its completion

This work is intended to emirace the entire descriptive anatomy with the exception of histology, and is likewise to have due regard for the field which has

between inicroscopic and macroscopic anatom) proper

The topographic relations of the organs and especially of the vessels and nerves, have been given the utmost consideration obtainable within the compass of a book which treats primarily of descriptive anatoms. When objects have appeared difficult from a teaching standpoint, many drawings were made from every possible view point

The text gives a clear description of the figure, and it is much more detailed than is really necessary in an atlas in which the illustrations are the essential, yet it resembles many text books in completeness. For showing the soft parts.

the material was all carefully hardened in formalin

Notwithstanding the enormous cost of production, the price has been kept down to a figure that places this sumptuous work within the reach of every practitioner and student The majority of the illustrations are from original drawings by the well known anatomical artist, Bruno Heroux

The book speaks for steelf must be seen to be appreciated and when once seen, will be universally hailed as one of the finest anatomical atlases ever placed upon the market

J. B. Lippincott Co. Philadelphia . since 1792

The Diseases of Society

(The Vice and Crime Problem)

BY G. FRANK LYDSTON, M.D.

Illustrated. 8vo. Cloth, \$3.00, net. Postage, 17 cents extra

THE most direct, forceful, and out-spoken study of social conditions in this country which has yet been put into print. Lydston considers not only the police criminal, the anarchist, and the sexual pervert, but also that vast number of offenders against the moral and physical laws whom the courts cannot reach. He deals with the oppression of wealth, the rights and wrongs of organized capital and labor, the negro question and the crimes which have grown out of it, and with the offences of "society" at large. His book is written in the most trenchant and brilliant His statements cut to the bone; he tells the truth without fear or favor. As a physician, physiologist, and student of social conditions, he has had wide experience for many years.

CONTENTS

CHAPTER

I. Social Pathology.

II. The Principles of Evolution in their Relations to Criminal Sociology and Anthropology, and to Social Diseases in General.

III The Etiology of Social Diseases in General, with Especial Reference to Crime.

IV Neuroses in their Relations to Social Diseases—
Brain Development—Intanity—The Criminal Skull—Epilepsy—Hysteria—Suicide.
V The Chemistry of Social Diseases—Toxemia

V The Chemistry of Social Diseases—Toxemia in its Relations to Vice and Crime—Alcoholism, Narcotic Inebriety, and Auto-Intoxication.

VI. Anarchy in its Relations to Crime.

CHAPTER

VII. Sexual Vice and Crime.

VIII. Sexual Vice and Crime (continued) Satyriasis and Nymphomania—Sexual Psychopathy.

IX. The Race Problem in its Relation to Sexual Vice and Crime.

X. The Treatment of Sexual Vice and Crime.

XI. Genius and Degeneracy.

XII. Physical and Psychic Characteristics of the Criminal.

XIII. Illustrative Crania and Physiognomies of Degenerates—Types of Criminals.

XIV The Therapeutics of Social Disease in General, with Especial Reference to Crime.

Ť

PUBLISHED BY

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

White and Martin

Genito-Urinary Surgery

and Venereal Diseases

By J WILLIAM WHITE M D

John Rhea Barton Professor of Surgery University of Pennsylvania

AND

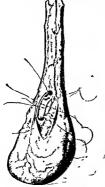
EDWARD MARTIN M D,

Professor of Clinical Surgery University of Pennsylvania

Octavo 7 colored plates 245 text illustrations 1068 pages Cloth, \$6 00. sheep. \$7 00 Sixth Edition *

THAT fite editions have been required in five years imply demonstrates the value of this standard work. The most concise lucid thorough modern, and practical book on the subject in the Fighth Inguinge.

practical book on the subject in the Figlish language
Those portions which deal with symptomitology and
diagnosis are unusually full and the illustrations are more
numerous than is



Anastomos s between the vas deferens and the head of the ep d dym s



subject (many being photographs from hite)
In treatment de scriptions of minipulations and operations regiven with such detail that those who have

usual in works on this

not had practical experience may be enabled to carry them out

All the practical points embraced under the general heading of Psychoputhia Sexuulis are carefully given while genito-unimy assepsis and antisepsis are so simplified and clearly stated that they are made practicable for every physician

There is included an exceptionally comprehensive study of the changes in the time and its constituents produced by disease a subject so intimately connected with the specially to which this work is devoted as to deserve much more attention than it usually receives

Everything is put in such form as to be of practical use to the general practitioner and student which accounts for the wide sale of the book and its almost universal adoption as a standard college text book,

Publishers J. B. LIPPINCOTT COMPANY

Barker

Manual of Human Anatomy

By LEWELLYS F. BARKER, M.B., Tor.

Professor and Head of the Department of Anatomy in the University of Chicago and Rush Medical College

ASSISTED BY

DEAN DEWITT LEWIS, A.B., M.D.

AND

DANIEL GRAISBERRY REVELL, A.B., M.B. Instructors in Anatomy in the University of Chicago

Octavo. 600 pages. 300 illustrations—many in colors. Cloth, \$5.00

HIS work is designed to be more systematic, more orderly, and to conduce to more thorough work in the dissecting-room than any of the Laboratory Manuals now on the market, all of which are more or less unsatisfactory, partly because so much is included that the student leans entirely upon his manual.

It is believed the use of Barker's Laboratory Manual will enable the good student to become an independent worker much more quickly than when he is left without such guidance. He will be able to do his work in less time and can assure himself that he is doing it thoroughly, using the manual merely as a control of his work, and the student who is well equipped will be gradually led into independent work which he might otherwise never attain.

There should also be a marked saving of time and energy for the instructor, enabling him to make contributions to knowledge by original investigation in his department. It will not, however, make "word of mouth" instruction superfluous. It is hoped that the use of the manual will make it possible for the instructor to concentrate his attention upon and to give better than before that particular help to the student which comes alone through the personal encounter. The sequence of dissection and the methods of exposing the various parts are those almost universally adopted in the better English and American laboratories. There seems to be no doubt that this nomenclature will be the present one for at least many years to come, but, in order that Barker's Manual may be used with the older text-books, the old terms, when different from the new, have been added in parentheses, and both sets of terms are indexed at the back of the book, so that the student may never be embarrassed in using any text-book or atlas in conjunction with Barker.

It is one of the most sumptuously illustrated manuals ever offered. The eolored illustrations are numerous, beautiful, and practical.

J.B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Wharton and Curtis

Practice of Surgery

By HENRY R WHARTON M D

Cli n cal Professor of Surgery in the Woman's Med cal College Philadelph a Pa. Surgeon to the Prebyterian and Children a Hospitals. Consolling Sugont of Surgeont Philadelphia I can or the American Surgeon Association.
Mawr Hospital Fe or or the American Surge cal Association

B FARQUHAR CURTIS M D

Professor of Cl. n. cal Surgery and Adjunct Professor of the Princ place of Surgery in the Unificest by and Edits we 'bell cal College of 'ver' North Surgery in Sec. Living 110-1 pla and to the Uniformal Hospital Fellow of the American Surgical Access 40 on

Octavo 1241 pages 923 text illustrations 18 colored figures Cloth \$650 sheep \$750 Third Edition*

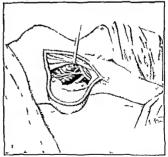
I has sork a large amount of space is given to subjects of practical importance such as frictures dislocations wounds etc. with due attention to small details of treatment which are so important in obtaining good results. I amy paragraps certain more information than pages of other works to such the profess on is accuss tomed. Fige-carlily in the lines of a genose and terratment,

directions are satisfactory minute clear easy of reference copiously illustrated with carefully selected cuts most of them original ridd in greatly to it evalue of the book by explaining the text and furnishing a means of reference for diagnosis. This is especially so of the chapters on Amputation Bandaging Fractures and Dislocations,

Tumors D seases of the Breast of the Female Genitals Mouth and Jaws and Orthopæd c Surgery The chapters that

The entities that has been the most highly praised by the reviewers and that will most strongly appeal to the general practitioner are those on Wounds, Asepsis Anti-sepsis Fractures Dislocations the Abdomen Breast Head and Spire Diseases of the Mouth Tongue Rectum and Genito Urnary Organs

This is not an ordinary plate revision but the entire book has been reset every part be ng re written to bring it abreast of the times



Removal of he b east the d spect on of the audia has been completed and the breast tumer and glands are ready for removal in one mass

Publishers

J B LIPPINCOTT COMPANY
When writing please mention Annals of Surgery

Philadelphia

About Antitoxine if you are very particular wire Steaming

T is prepared by scientific experts in one of the finest biologic plants in the world, under U. S. Government inspection.

It is drawn from carefully selected horses yielding a serum of high potency.

It is bacteriologically and physiologically tested and very accurately standardized on animals before being sent.

It is in every respect the highest quality antitoxin that science, skill, and extraordinary facilities can produce.

Its life-saving results in diphtheria are unparalleled by those of any other serum before the medical profession.

It is put up in the most convenient syringe—the Simplex—which is as easy to operate and under as perfect control as a \$4 hypodermic syringe. No breaking of glass in assembling: no cut fingers.

Each package contains a small vial of Alphozone, the most potent non-toxic germicide, for disinfecting the throat, mouth, and nasal passages.

"A Model Biologic Laboratory," the beautifully illustrated book descriptive of our \$100,000 biologic plant, will be sent on request. It is worth reading.

Writing "Must be Stearns" on your orders shows the druggist unmistakably what kind you want.



WINDSOR, ONT-LONDON, ENG. NEW YORK. CITY.



St. Winifred's Hospital,

SAN FRANCISCO, CALIFORNIA

A New FIRE-PROOF Hospital
with Fifty Sunny Rooms Centrally
located. The most Modern Operating
Rooms in the West. A Private Sana
torium for Medical and Sanycai Cases.
winslow Anderson M.D., M.R.C.P. Land
ste., Medical Operator.
Minslow Anderson M.D., M.R.C.P. Land
ste., Medical Operator.



For Points in

Missouri

Arkansas

Oklahoma Indian Territory

TEXAS

Through Cars from St Louis and Kansas City and from

New York to Memphis

HAL S RAY G E P A 401 Broadway NEW YORK

B SNYDER P T M A HILTON & P A

IT UN ON SQUARE

Dear Doctor -

No physician likes to be bothered by having a fatist running to him with complaints about an elastic stocking

We do away with all complaints by using the best of motorials in our Martin grade and making them to order so they get

Pomeroy Company

**

Elastic Stockings

| Price | Pric

Pomeroy Company
17 Union Square
New York





New York

Bureau of Health Chemists Endorses Bailey's Pure Whiskey



To the testimony of some of the best known physicians of Philadelphia, and that of nurses whose professional duties demand that they occasionally use a pure whiskey, comes the following remarkable endorsement from Doctor William C. Robinson, chemist of the Philadelphia Bureau of Health:

I have tested five quarts of whiskey labelled "Bailey's Rye Whiskey," taken in sealed bottles by me from the stock exposed for sale at your store, 1209 Market Street, by 51x different methods, including three well known ones (the Miller, the Resorcinol, and the Phloroglucin). In all the samples, and by all the methods, the results were negative. In other words, I found these whiskies to be free from adulteration and all foreign and injurious admixtures.

The same chemist analyzed our wines, and found them free from all

adulterations or preservatives.

An analysis of the whiskey was also made some years ago by the Franklin Institute, when its absolute purity was pronounced.

SPECIAL OFFER TO PHYSICIANS AND NURSES.

In order to give professional practitioners the opportunity of observing the excellent quality of Bailey's Pure Rye for themselves, we will send to any address one gallon of the \$1 50 per quart whiskey (the famous Yellow Label) for \$4 00—a discount of 33½ per cent. On all orders after that we will allow a 10 per cent. discount. This is open only to physicians and nurses, for home or professional use.

Write for copies of analysis, etc.

HUEY & CHRIST

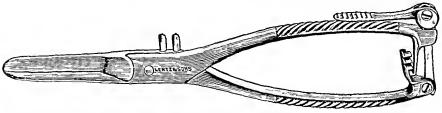
1209 Market Street

PHILADELPHIA

Surgery Without Ligatures

DOWNES' ELECTRO-THERMIC ANGIOTRIBE

HÆMOSTASIS BY PRESSURE AND HEAT



Four Styles of Forceps, three straight blades, ¼, ¾, and ½ inch wide, and curved blade ¾ unch wide.

Over 600 major abdominal operations performed without secondary

Forty leading American surgeons are now using them. Write for reprints and circulars.

CHARLES LENTZ & SONS

Manufacturers of Surgical Instruments

18 and 20 North Eleventh St.

Philadelphia

ORDER THE AMBLEATORS

Adjustable to Recumbent or Ambulatory Treatment of FRACTURES

Disease
RECOVMEND IT TO YOUR PATIENTS
Good Res Its Count Write Ls Telegraph Or
ders Gisen Prompt Attention Respectfully
AMBILATORY PRESENTED STATE OF CO.
169 E Randolph Street CHICAGE

EUCAIN LACTATE

Prof Katz, of Berlin reports excellent results from the use of cucain lactate in rhinology and otology This new salt is soluble in water to the extent of 25 per cent, while eucain hydrochlorate is only about 31 per cent water soluble ponade morstened with 15 per cent encum lactate solution, left in the nose for four or five minutes, produced a thoroughly eatis factors anesthesia prior to the introduction of the sound for diagnosing the position size and nature of polypi and nasal hyper troplaces. For the removal of growths by snare or forceps euclin is preferable to cocam, as it is far less to tic and does not cause shrinkage There is, besides, no eccondars hemorrhage, as eucain lactate does not possees the constricting action of cocain. In some cases the new salt was used in 2 per cent strength for submucosal injection, with prompt anesthetic effect, despite the bleed ing produced by the puncture of the needle

In otology eucuan lactate as advantageously used for the removal of polypt and granula tons as well as prior to passing the sound Here also it possesses the ment of not causing shrinkage. When, lowever, local isoliruma of the mucons membrane is destrable, it may be used in combination with suppragnal preparations.

Frof. hatz was highly graitfied by the effects of a dusting powder of eucum lactate, adrending and milk sugar, used after surgical procedures in the nose.

Sepecially neeful was it after cauterization for the prevention of growths on the mucous membrane the powder being invuffiated daily for about ax days—Abstracted from the Therapeutuche Monatakefts, August, 1904

When writing please mention Avvals of Surgest

Virginia Hot Springs

2500 FEET ELEVATION OPEN ALL THE YEAR

Waters, baths, hotels and scenery nowhere equalled

Rheumatism gout, obesity and nervous diseases

The Chesapeake & Ohio Railway,

generally
FRED STERRY Menager Hot Springs, Va.



FREE
Catalogue H,
THE 20TH CENTURY
POLYCLINIC CHAIR

Manufactured by The Perfection Chairco. Indianapolis, ind.

The WALKEASY

GEORGE R FULLER CO ROCHESTER N Y
Meneden, Chicago, Monthio, Menen Philipdelphia

SAL HEPATICA. Effervescent une actd

solvent and chungalor stimulates liver lones all intestinal glands pu riles alimentary tract and improves digestion assimilation and melabolism It is practically specific in rheumalism gont and billous attacks Sal Hepatica has no equal for eliminating toxic products from in testinal tract or blood and correcting victous or elogged functions Write for free sample BRISTOL MYERS CO New York



REDUCED TO THREE DOLLARS A YEAR.

JOURNAL OF THE Association of Military Surgeons of the United States.

The only Journal devoted to the Military Aspects of Medicine, Surgery and Hygiene in the United States.

Announcement.

Original Articles.

The Journal will, in each number, continue the publication of original papers of the high order which has hitherto characterized the work of the Association. Arrangements have been made for important memoirs relative to the medico-military conduct of campaigns in all lands and by all nations.

Reprints and Translations.

The medico-military literature of other countries will be freely laid under contribution, and all important articles in contemporary literature will be drawn upon.

Medico-Military Index.

All articles in current literature pertaining to military medicine, surgery and hygiene, not republished will be promptly reported.

Editorial Department.

An accomplished corps of collaborators will cooperate with the editor in presenting timely discussions, reviews, comments, and general information relative to current events of medico-military interest.

Typography and Illustration.

The Journal will continue to be printed in the best style upon heavy supercalendared paper and fine illustrations will continue to be freely employed whonever possible to elucidate the text by their use.

Subscription, Three Dollars a Year in Advance.

Free to members of the Association of Military Surgeons of the United States

Association of Military Surgeons,

Carlisle.

Pennsylvania.

REDUCED TO THREE DOLLARS A YEAR.

ANTIPHLOGISTINE

A prominent physician in lecturing recently on a case of scuile pneumonia at the Philadelphia Hospital, said —

"Hot flaveed poultrees well nude so as to retain their heat for four hours, were kept about the thorax during the day and at night were repliced by a lumb's wool jacket for the better part of a week. It is important when poultrees are need that they should be well unde and should retain their best for four hours, in order that the pittent shall not be continually disturbed to change them. Fever patients need rest, not only sleep at

hours or more, instead of the bacteria breeding, soggy, clammy his eed and other

Positices?

Nost up to-date doctors say — Yes we know all about Antiphilogistine and use it

regularly as routine treatment in all cases

where inflammation is present and a local remedial agent is indicated "

Picture an individual with temperature 104° to 105°, pulse 120 140, resp. 40-70 If



9 - 0

For the Blues GOLDBECK'S Malt Fxtract

The bluepatient be comes still more blue if required to introduce some unpalatable tonic into his daily toutine.

Try Something

Goldbeck's Mait Extract is a pleasant tonic It is smooth and palatable, coaving forth the reluctant appetite. It is rich in nutritive elements, supplying the deep foundations of perfect

Especially useful for Nursing Mothers

JOHN F BETZ & SON, Limited Crown and Ca lowbill Stree : PHILADELPHIA PA

nture is muntained Refreshing sleep is in vited, and not hindered. It stimulates the

The circulation is thus favorably affected

the mu-cular and nervous systems are relaxed and refreshing sleep in invited

Nerve Disorders.

If your patient suffers from THE BLUES (Nerve Exhaustion), Nervous Insomnia, Nervous Headache, Irritability or General Nervousness, give one teaspoonful four times a day.

Neurilla is prepared from Scutellaria and Aromatics, and is absolutely harmless even under prolonged use.

Dad Chemical Company, . . New York and Paris,



AN OLD REMEDY COMBINED WITH A NEWER ONE

The Masachusetts Medical Journal recently published the following, which will no doubt be interesting to our readers —

"We believe that members of the medical profession should familiarize themselves with the combination tablet of antikamma and

by all oids, the most efficient of recent ad ditions to our list of remedies. The advantages of this combination are fully illustrated by a report of cases submitted to us by Drutel N Bone, Professor of Surgery and Pharmacology, College of Physians and Eurgeons, St. Louis. We reprint three of sud cases, as each has some particular feature which successfully called into use, in a most beneficial manner, the syneryctic action of these two dures

"Case I J P Athlete Suffering from an acute cold On examination found temperature 101° with a cough and bronchial rales Patient complained of pain induced

one tablet three times daily for three days, when he ceased taking them, and there has been no return of the cough or pain

"Case II Ed II Age 30 Tamuly history—hereditary consumption Hemorrbage from lungs eighteen months ago Ilis physician had me extunine spatum, found tubercle bacili After prescribing vanous remedies with very little improvement, I placed him on antikamins and herom tablets, prescribing one tablet three timers day

pounds in last 30 days. Consulted me Iuly
9th I thought he most certainly would fall
inclim to tuberculo's Evening tempera
ture 101° with inght-sweats and a very
troublesome cough with lancimiting pains
Presembed 1-100 gr atropine to relieve the





\$12.50 Delivered anywhere In the United States

Took in use and every one giving entire satisfaction.

Wale in one continuous bat Will never become lumpy or packed is dust and ver min proof and is renovated by sanning.

OUR GUARANTEE.



THE HYGIENIC PERFECTION MATTRESS.

It Cannot Fell to Gire Entire Satisfaction.

Tours truly,

A B CURRY,
Pasti r Second Presbyterian Church, Mem

phis, Tenn.
WRITE TODAY FOR FREE LITERATURE

PERFECTION MATTRESS CO.

227 21st Street N Birmingham, Ala

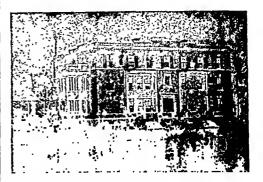
GLYCO-THYMOLINE IN MINOR SURGERY.

By John T. Harrison, M.D., N. Y. City

Mr. Z., age 26, occupation, varnisher, came to me with a gunshot wound of the left hand. Examination disclosed the fact that the ball had passed through, causing a compound comminuted fracture of the second metacarpal bone. I removed several pieces of bone and irrigated the wound and applied the usual dressing of antiseptic gauze, cotton, etc. On removing dressing next day I found there had been a considerable discharge of pus, and again irrigated and dressed as before. Removal of dressing on third day showing a continuance of pus, I determined to alter my line of treatment, and I thoroughly irrigated the wound with a 25 per cent. solution of Glyco-Thymoline, and after applying dressing, saturated it with the same solution.

The next day I found the dressing moist, and on removal there was scarcely any pus to be discerned. The same treatment was followed on the next and succeeding days until on the fourth day after beginning use of Glyco-Thymoline the wound was completely healed.

Since then I have demonstrated the value of Glyco-Thymoline in minor surgery on several occasions to my own satisfaction, and am convinced that surgery is almost as great a field for its use as is gynecology or nose and throat work.



SARAH LEIGH HOSPITAL Norfolk, VA.

A new, thoroughly up-to-date private hospital. Rooms single or *en suite*. Private Baths. Quiet surroundings. Salubrious Climate. Especially for Surgical, Gynecological and Rest Cure Cases. A few Medical cases taken.

Correspondence with physicians invited. Address one of the following:

DR. SOUTHGATE LEIGH, SURGEON IN CHARGE DR. STANLEY H. GRAVES, ASSOCIATE, MIBS M. A. NEWTON, SUPERINTENDENT.

DEFENSE

OF MALPRACTICE

SUITS IS GOOD

But the Busy Doctor also wants

PROTECTION

The Fidelity and Casualty Company of New York

Defends its clients against any such Proceedings at its Own Cost, and if Damages are awarded will PAY them.

Special Accident and Health Insurance for Physicians, Surgeons, Dentists, etc.

LIGNOL in Surgery

Powerful Non-Caustic Antisentic

NATURAL OIL

Fistulas Skin Diseas

The most perfect lubricant for Sounds and Speculums

A trial of this Natural Od will demon strate its usefulness Literature and samples promptly for nished on application

LIGNOL SOAP

Antiseptic Superfatted Dermatological Soap Makes the most efficient, the most

Makes the most efficient, the most readily used, also the cheapest douche for the treatment of Leucorrhoea.

THE GIRARD COMPANY, Inc. Pharmaceutical Chemists

1308 Sansom Street . Philadelphia, Pa

A Plain Statement of Important Facts

The medical profession has been consettenth, cautioned by Pond's Extract Company as to the danger of purchasing and pre-cribing commercial witch hazel which has no standard of curity and quality

which has be standed in printy we should be these afforts a product plus ticks and particular like it is now amounted that within the last two months sexual supplies of writch barel has teen purchased from as many wholesak and retail disalers in the commer clair strikt in six of the largest cities of the Lindel States and that on exceptions inter-tigation is to the commer of the strike the sexual that no exceptions in the commer clair strikt in six of the largest cities of the benefits of the country first two samples of t

In the face of such pernicious conditions limits to the use that in all cases in which hamannits is inducated only a standardized product of invariable parity quality and strength—like Poul's Tyrizact of Hamanits—use safely preserted and used

GENITO-URINARY IRRIGATION BASIN

DESIGNED BY DR J B CARNETT, PHILA., P.



Price, \$7.00 each

THE VALZAHN CO.

PHILADELPHIA SURGICAL INSTRUMENT HDUSE

132 South Eleventh Street FHILADELPHIA, PA

FOR MALE PATIENTS

This basin is constructed of nickel-plated copper and readily contains two quarts of solution.

Its shape is shown by the

It is so constructed as to rests comfortably between the patient's legs and is self-supporting, by means of two wide flanges, which rest across the front of the thighs

It is designed especially for office work of the physician and for those cases in which the patient himself carries out a prolonged course of irrigation.



Phénol Sodique

Antiseptic, hemostatic, antiphlogistic, and prophylactic surgical dressing for cuts, burns, sores, bruises, and inflammation.

"SOLULES"

Ergaloids

For scant, suppressed, fetid, and painful menstruation. Indicated in Amenorrhea and Dysmenorrhea.

Samples and literature upon request. Mention this Journal.

MANCE BROTHERS @ WHITE

PHARMACEUTICAL CHEMISTS

Philadelphia

New York

Chicago



rectrical for Physicians'

SNELL AMERICAN CYSTOSCOPE.

COLD LAMP -- WATER OR AIR DILATATION -- DIRECT VISION

IN THIS INSTRUMENT ARE COMBINED

The successful features of all other American or European instruments constructed for bladder inspection or uneter catheterization, together with the following seven additional important advantages:

First.—BOTH useters can be catheterized at the same operation through one and the same catheter chamber.

Second.—One-third larger field of vision is obtained than with any other double catheterizing cystoscope of SAME outside caliber.

Third.—We give you the same size field of vision as other double catheterizing cystoscopes, but with the SNELL AMERICAN instrument of five sizes smaller caliber.

Fourth.—You can use either WATER OR AIR DILATION easily and successfully with the same instrument.

Fifth—An achromatic lens system giving a large and magnified field without reflexes or rainbow hues.

Sixth.—After BOTH ureters have been catheterized and catheters are entirely outside of cystoscope (see technique) you can examine both ureters and ascertain positively by seeing whether catheters are still in the ureters or not.

Seventh.—The most important and incalculable advantage is that when cystoscope is withdrawn from bladder and urethra, THE CATHETERS ARE NOT WITH-DRAWN (as is generally the case with all other instruments).

These seven very important features are the result of over one hundred actual demonstrations on living subjects, demonstrations which have been made with and for a large number of the most prominent surgeons in the United States, and if you are thinking of purchasing a cystoscope, you cannot afford to consider any instrument which does not give you these advantages.

Manufactured solely by CHICAGO ELECTRO APPLIANCE CO.

67 Wabash Avenue, Corner Randolph Street,

Chicago, Ill.





Strength and vitality are required to wear through severe weather. Strength and vitality must be rallied against the storms of Influenza and Pneumonia.

Pabst Extract

is a stimulant always to be depended on while the storm is being faced, and a nutrient of highest value as well. And when the long after-period of low vitality is to be endured, it puts heart and hope into the exhausted fighter.

This Malt Extract builds steadily, replaces losses, and holds all gains strongly and surely.

PABST EXTRACT LABORATORY

For Subacute and Chronic Inflammation

(Especially of the vagina or urethra) the most satisfactory results follow the use of



It is always convenient, easy of application, comforting to the patient, effective as a deodorant, absolutely to be relied upon as a powerful, non-poisonous germicide and antiscptic, with local anæsthetic properties in the treatment of severe cuts, wounds, SULPHO-NAPTHOL has immense advantages over carbolic acid, in that it may be used with freedom in all the natural cavities of the body.

> WE WILL GLADLY SEND SAMPLE AND LITERATURE TO ANY PHYSICIAN MENTIONING THIS JOURNAL

THE SULPHO-NAPTHOL 46 HAYMARKET SQUARE, -BOSTON, MASS.

NATIONAL LINES OF

MEXICO

National Railroad Company of Mexico Mexican International Railroad Interoceanic Railway of Mexico

3300 Miles Under One Management

THREE ROUTES TO MEXICO

Laredo-Eagle Pass-Veracruz

For Time Tables, Rates, and other information, address:

W. F. PATON, Gen'l Eastern Agt., 11 Broadway,

G. R. HACKLEY, Gen'l Western Agt., 230-235 Quincy Bldg., New York, N. Y. Cor. Clark and Adams Sts., Chicago, Ill.



"Colorado Short Line," ...DIRECT TO...

Glenwood Springs, Colorado

-amous Resorts 👯 Rockies.

Elegant Pullman Sleeping Cars, Observation Parlor Cafe Dining Cars, with Blectric Lights and Fans, and Free Reclining Chair Cars.

W. E. HOYT, G. E. P. Agt., 335 Broadway, N.Y.

NO GUESSWORK

PARKE, DAVIS & CO'S

Antidiphtheritic

Serum



OF CNIFORM THERAPEUTIC ACTIVITY

IT IS

Bacteriologically and Physiologically Tested

> NO QUESTION OF ITS PURITY AND SAFETY

OF ILS PURITY AND SAFE

SUPPLIED IN THE WELL - KNOWN
P D & CO PISTON SYRINGE
CONTAINER

(MERMET CALLY SEALED)

The most practical ready to use serun syringe ever dev sed

(Bulls of \$100 1000 2000 \$200 and \$100 up ta.)



PARKE, DAVIS & CO.



JAMAICA

WHERE SUMMER IS 12 MONTHS LONG

An increasing number of tourists and health seekers who wish to escape the harsh Northern Winter are yearly choosing Jamaica. Its gentle climate, gorgeous tropical scenery, outdoor recreations and splendid hotel accommodations offer unusual inducements to the sojourner.

Nowhere can winter be spent so delightfully

THE UNITED FRUIT COMPANY'S Steel, Twin-Screw U. S. Mail Steamships

ADMIRAL DEWEY ADMIRAL SAMPSON ADMIRAL SCHLEY ADMIRAL FARRAGUT

sail weekly from Boston and Philadelphia, Steamships BROOKLINE and BARNSTABLE weekly from Baltimore. The passage down the coast is the favorite short ocean voyage.

Round Trip Fare, \$75 [including menls] Single Fare, \$40

Write for Jamaica literature describing and illustrating the Island and tours of interest.

Address Division Passenger Agent,

United Fruit Company, Long Wharf, Boston; 5 North Wharves, Philadelphia; Hughes & Henry Sts., Baltimore
Raymond & Whiteomb Co.

Thos. Cook & Son. Tourist Agents

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic,
Antiseptic and Styptic. The application of
Orthoform to wounds of whatever character
relieves pain for hours, frequently days. Also
itching and pain of Pruritis, Eczema, Laryngeal
Tuberculosis, Otitis, Conjunctivitis, etc.
Used as sprinkling Powder, Insufflation, Emulsion

Vo/-41 - 1905 - Feb. NO2

Literature on application to

VICTOR KOECHL @ CO.



No matter how much one might feel inclined to pay there is nothing better to be had. Those who wear it are best qualified to arrive at a true estimate of its real value which may be made in the following way.



Fill in your own figures and you will find that you cannot afford to be with-

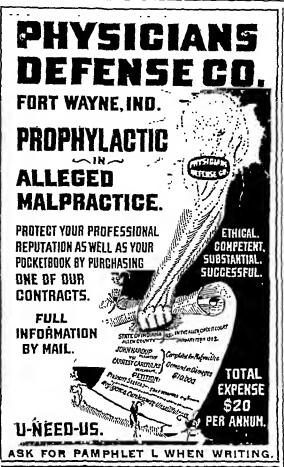
A few suits will give you a chance to verify your estimate

All Dr Deimel Garments bear the Dr Deimel name For sale at the best Dealers everywhere For Booklet Samples and Full Informatio 1 Address

THE DEIMEL LINEN-MESH COMPANY 491 BROADWAY, NEW YORK

SAN FRANCISCO WASHINGTON BPOOKLYN BALTINGRE MONTREAL, 111 Montgomery Si 1213 k St. NW. 540 Fullow St. 116 W. Lexington St. 1222 St. Catherine St. LOVIDON ST Strand (Hotel Ceel)

Dr Deimel Linen Mesii Supporters Suspensories etc are made and sold exclusively by J ELLWOOD LEE CO , Conshohecken, Pa



DR. BROUGHTON'S Sanitarium

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to

R. BROUGHTON, M.D. ROCKFORD, ILL.

PILK'S MEDICAL HEHRIAN

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

See that the name R. L. POLK & CO.
IS ON THE ORDER BEFORE YOU
SIGN IT.

POLK'S is the only complete Medical Directory.

POLK'S is the only Medical Directory having an index to all physicians in the United States.

POLK'S has stood the crucial test of time with increasing popularity. It thoroughly covers the field.

F. L. POLK & CO., PUBLISHERS

SUBSCRIBE NOW.

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in confort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

SCHERING'S

Ex-

Tasteless and odorless cathartic, unique in promptness, reliability, pleasantness and harmlessnees.

Duotonol A 100% compound of Lime and Sodium Glycero-phosphates (1:1), convenient for dispensing and administration.

Urotropin Effects a urinary antisepsis that was wholly unattainable before its introduction by Prof. Nicolaier.

Formalin Lamp Renders infections shorter and milder, lessens danger of contagion. Invaluable in all zymotic diseases.

Literature on request.

SCHERING & GLATZ, New York.

CHICAGO

ROENTGEN X-RAY

LABORATORY

6000 Skisgrapha taken within past aix years

SEND for book containing Stangraphs of lumors Cysts and blood the six the Brau Reual Ves cal and Blood the Stangraphs of Lumors Cysts and Stangraphs of Lumors Cysts and Stangraphs of the Heart Abruptson, Peroa ng Kidenya, Tumors, Long Description, Stangraphs of the Heart Abruptson, Peroa ng Kidenya, Tumors, Long Description, as obeformitten of the Hip Spar and other parts of the body

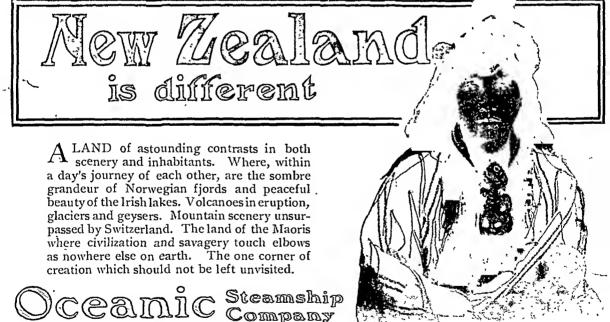
Esizblished May, 1896 for Medical Disgussis

W C. FUCHS
404-407-408 Schiller Bidg
103 109 Randolph St.
CHICAGO

Telephone Central 1155







American and Australian Line

Offers a luxurious passenger service between San Francisco, Hawaii, Samoa, Tahiti, New Zealand and Australia. Around the World. Send 15 cents postage for handsome New Zealand book. Illustrated folder free.

J. D. SPRECKELS @ BROTHERS CO., General Agents, 643 Market Street, San Francisco

E. F. BURNETT, General Eastern Agent, 429 Broadway, N. Y. When writing, please mention Annals of Surgery.

Nature's method of providing against the admission of septic matter is by plastic infiltration, then follows an

Effort to wash out the offending matter by an exudation of serum

To obstruct this wise system by the use of escharotic antisentics acts to

Produce conditions which have the effect of

delaying Resolu-

tion

Glyco-Thymoline Aids nature in her pro

cess of repair maintaining the fibrin in soluble form stimu lating capillars circulation fostering and sustaining cell growth resulting in the rapid formation of healthy granulations A practical dressing for all wounds burns

and pleerated conditions

SAMPLES AND LITERATURE IF YOU MENTION THIS JOURNAL

RRESS @ OWEN CO.

210 Fulton Street

New York

THE VERY THING, DOCTOR

You have been looking for ever since Sterllizere have been in use



ALCOHOL GAS STOVE

Flavell's Superior Appliances Are Offered to Physicians at Net Prices

Abdominal Supporter



cumference of abdomen at h. L M Elestic \$3.25

FLAVELL'S Uterine Supporter Net price for \$2.00

Goods sent by mail

upon recelt tof price Safe delivery guar auteed Reliable goods only

G. W. FLAVELL & BRO 1005 Spring Garden Street Philadelphia, Pa

A Profitable Investment

SMALL AMOUNT OF Schwahn Reduction Company's stock, left unsold from its first allotment of 250,000 shares, is offered for subscription. There are 50,000 shares of stock to sell. The par value is \$1.00 full paid and non-assessable. These shares are offered at 50 cents per share, and will continue to be offered until the entire block is sold. The proceeds are used exclusively for the completing of the Company's works at Belleville, Ill.

The Schwahn Reduction Company (Incorporated) does a general manufacturing of Chemical Products pertaining to Aluminum, and will produce Metallic Aluminum and its Alloys and Products thereof. The manufacture of the Sulphate of Aluminum, the material from which the metal is produced, will be in full operation on a commercial scale from December 1, 1904, guaranteeing by its extensive use for many industrial and domestic purposes a handsome Dividend from the start. This is a conservative and strictly safe investment. The manufacture and the profits are based on valuable patents in the United States and abroad, permitting operation at a cost of at least fifty per cent. less than heretofore possible.

Write for prospectus and descriptive literature. Some of this literature will greatly

interest physicians without a view to investments. Correspondence invited on this subject.

THE SCHWAHN REDUCTION COMPANY

601 Fullerton Building St. Louis, Mo.

From the Engineering and Mining Journal, November 10, 1904.

"The Schwahn Reduction Company, of St. Louis, has an exhibit in the Mines and Metallurgy Building at the World's Fair, designed for the purpose of bringing to the public notice the process of producing aluminum by a pyro-chemical reaction, or the 'Schwahn Process,' patented in the United States, Germany, and elsewhere. By this process the aluminum is reduced by means of heat and reducing gases from Sulphate of Aluminum, which may be produced from common clay, such as kaolinite, by the 'Schwahn process for preparing aluminum sulphate,' also patented. These processes are demonstrated and shown in this exhibit by numerous displays of the intermediary stages, beginning with the clay and ending with the final product—the metallic aluminum—thereby furnishing the proof of success. It is claimed the 'Schwahn Process' makes aluminum at such a cheapening of cost and purity that it will stimulate the consumption of the metal, and allow its use for many purposes which the hitherto high price has made prohibitory."

Awarded a Metal Prize at World's Fair, 1904.

ANTISEPTIC ANESTHETIC **ANTIPHLOGISTIC**

Unique in its properties and in the extent or its application. It is a local anesthetic which saturates and antisepticizes the tissues without injury. It removes pain, subdues inflammation, and absorbs suppuration.

PYROLIGNEINE

In surgery it replaces iodoform and bi-chloride, affording certain advantages all surgeons will appreciate. The clinical reports sent with samples give practical in-SAMPLES formation as to the extent of its application. Drop us a card NOW for samples and literature.

THE PYROLIGNEINE CO., Winchester, Tenn.

Kutnow's improved Powder

"The Practitioner," England, says :--

MARCH, 1904

"This preparation possesses a pleasant taste.

It is a very pleasant form of laxative medicine, acting, if taken in hot water before breakfast, on an empty stomach, in the space of about one hour. Kutnow's Powder will be found most useful by sufferers from hemorrhoids, as it is gentle in its effects, while relieving the loaded portal system by its hydragogue action."

ENDORSED BY

Especially valuable for Surgeons after operations, to overcome the nausea after the anesthesia and to coax the peristaltic action



tion, Biliousness and is most useful in all derangements of the Stomach, Liver, and Kidneys.

Removes Con-

stipation, Indiges.

LAWSON TAIT

SAMPLES SENT FREE TO PHYSICIANS

APPLICATION FORM FOR A FREE TRIAL OF KUTNOW'S POWDER TO SALE MEDICAL PROFESSION ADDRESS Annals of Surgery

Kutnow Bros., Ltd.,

853 Broadway, New York, U. S. A. 41 Farringdon Road, London, Eng

BOOKS FOR SURGEONS

- BERRY.—A Manual of Surgical Diagnosis. By JAMES BERRY, M.B., B.S., F.R.C.S. 12mo; 363 pages. Cloth, \$2.00 net.
 - The Thyroid Gland; Its Diseases and Their Treatment. By JAMES BERRY, M.B., B.S., F.R.C.S. 121 Illustrations, from Original Photographs of Cases. Cloth, \$4.00 net.
- Burrell and Blake.—Case Teaching in Surgery. Containing complete clinical histories and physical examinations of 75 actual cases, serving as a basis for exercises in diagnosis, prognosis, and treatment. By Herbert L. Burrell, M.D., and John Bapst Blake, M.D. 12mo: Cloth, \$.75 net.
- BUTLIN.—The Operative Surgery of Malignant Diseases. By HENRY T. BUTLIN, F.R.C.S. Second Edition, Revised and Rewritten. Illustrated. Octavo. Cloth, \$4.50 net.
- DEAVER.—Surgical Anatomy. A Treatise on Human Anatomy in its Application to the Practice of Medicine and Surgery. By John B. Deaver, M.D. With 499 very handsome Full-page Illustrations, engraved from original drawings, made by special artists, from dissections prepared for the purpose in the dissecting-rooms of the University of Pennsylvania. Three large volumes. Royal Square Octavo. Sold by Subscription, complete sets only. Half Morocco or Sheep, \$30.00; Half Russia, \$33.00 net.
 - Surgical Anatomy of the Head and Neck. By JOHN B. DEAVER, M.D. With 177 Full-page Plates, nearly all of which have been drawn from Special Dissections. One Royal Square Octavo volume. Half Morocco, \$12.00 net.
- Douglas.—Surgical Diseases of the Abdomen. With Special Reference to Diagnosis. By RICHARD DOUGLAS, M.D. 20 Full-page Plates. Octavo; 833 pages. Cloth, \$7.00; Sheep, \$8.00 net.
- JACOBSON.—The Operations of Surgery. By W. H. A. JACOBSON, F.R.C.S., and F. J. STEWARD, F.R.C.S. Fourth Edition, Revised and Enlarged. 550 Illustrations. Two volumes. Octavo. 1524 pages. Cloth, \$10.00; Leather, \$12.00 net.
- KEAY.—Gall-Stones: Their Medical Treatment. By J. H. KEAY, M.A., M.D. 12mo. Cloth, \$1.25 net.
- KEHR.—Diagnosis of Gall-Stone Disease. Including 100 Clinical and Operative Cases illustrating Diagnostic Points of the Different Forms of the Disease. By Prof. Dr. Hans Kehr, of Halberstadt. Authorized translation by William Wotkyns Seymour, A.B., M.D. 12mo; 370 pages. Cloth, \$2.50 net.
- Lees.—Acute Visceral Inflammations: Their Treatment. By D. B. Lees, M.A., M.D., F.R.C.P. 12mo. Cloth, \$1.50 net.
- MAYLARD.—The Surgery of the Alimentary Canal. By Alfred Ernest Maylard, M.B., B.S. Second Edition. 97 Illustrations. Octavo. Cloth, \$3.00 net.
- MORRIS.—Textbook of Anatomy. A Complete Textbook. Edited by HENRY MORRIS, F.R.C.S. Third Edition, Revised and Improved. One handsome octavo volume, with 846 Illustrations, of which 267 are printed in colors. Thumb Index and Colored Illustrations in all copies. Cloth, \$6.00; Leather, \$7.00 net.
- MOULLIN.—Enlargement of the Prostate: Its Treatment and Radical Cure. By C. W. MANSELL MOULLIN, M.A., M.D., F.R.C.S. Illustrated. Third Edition, Enlarged. Octavo. Cloth, \$1.75 net.
- ROLLESTON.—Clinical Lectures and Essays on Abdominal and Other Subjects. By H. D. ROLLESTON, M.A., M.D., F.R.C.P. Octavo. Cloth, \$1.50 net.
- VOSWINKEL.—Surgical Nursing. By BERTHA M. VOSWINKEL. Second Edition, Revised and Enlarged. 111 Illustrations. 12mo. Cloth, \$1.00 net.
- Walsham.—Surgery: Its Theory and Practice. By Wm. J. Walsham, M.D., F.R.C.S. 8th Edition, Revised and Enlarged, by Walter George Spencer, M.B., F.R.C.S. 8vo; 1227 pages. 622 Illustrations, including 20 Skiagrams. Cloth, \$4.50 net.
- WRIGHT AND PRESTON.—Handbook of Surgical Anatomy. By G. A. WRIGHT, B.A., M.B., F.R.C.S., and C. H. PRESTON, M.D., B.S., F.R.C.S., L.D.S. 12mo. Cloth, \$1.50 net.

Complete Descriptions sent Free upon Request to the Publishers.

P. BLAKISTON'S SON & COMPANY

1012 WALNUT STREET

PHILADELPHIA

ANTIPHLOGISTINE

IS NOW THE STANDARD REMEDIAL AGENT

FOR PNEUMONIA, PLEURISY OR BRONCHITIS, PRIMARY OR SECONDARY TO LA GRIPPE OR TO ANY OTHER DISEASE

BECAUSE

- 1 —Antiphlogistine is far more efficient than a poultice or any other external application
- 2 -Antiphlogistine draws the blood to the surface-bleeds but saves the blood
- 3 —Antiphlogistine, by reflex action, contracts the pulmonary vessels, thus depleting the lungs into the dilated superficial capillaries
- 4 -Antiphlogistine's anodyne effects enable it to allay pain
- 5—Antiphlogistine relaxes the muscular and nervous systems, thereby tending to induce sleep
- 6-Antiphlogistine works persistently and continuously for 24 hours or longer
- 7 -Antiphlogistine is neat and clean
- 8 -Antiphlogistine is easily applied and stays exactly where it is put
- 9 —Antiphlogistine comes off nicely at the proper time, leaving the parts comparatively elean
- 10-Antiphlogistine can do no harm and is certain to do good

IT IS ONLY A QUESTION OF PROPERLY APPLYING

Directions For Applying In Pneumonia — Prepare the patient in a warm room Lay him on his side and spread Antiphlogistine thick and as hot as can be comfortably borne over one half the thoracte wills — Cover with a good, warm, cotton lined cheese cloth jacket Roll the patient over on the dressed side and complete the application — Then stitch the front of the jacket — Prepare everything beforehand and work as rapidly as possible — The dressing should be renewed when it can be easily peeled off, generally in about 24 hours

To insure economy and the best results always order an original package and specify the size required—Small, Medium, Large, or Hospital Size

THE DENVER CHEMICAL MFG. Co.

Diabetes is of Pancreatic Origin

The Rational Treatment is to supply the Ferment whose Absence is the Cause of Diabetes Mellitus or Glycosuria

Tryptogen (Carnrick)

Formula: Trypsin, Ptyalin, Amylopsin, combined 5 grs. Gold Bromide, 1-100 gr., Arsenic Bromide, 1-200 gr.

Is the Most Reasonable Treatment of Diabetes Mellitus and Glycosuria in the Light of Present Knowledge. Tryptogen Meets the Nervous Factor in the Problem with its Gold Bromide and Arsenic Bromide.

For Sale by Druggists, in Tablet Form Only 100 5-gr. Tablets, \$1.25. To Physicians, \$1.00 Prepared by G. W. CARNRICK CO. 28 Sullivan Street, New York

EUSOMA

(Echinacea Compound.)

A Perfect, Non-Poisonous, Antiseptic and Alterative for both Internal and External Administration. * * * * *

A NATURAL AMERICAN REMEDY FOR THE AMERICAN PHYSICIAN

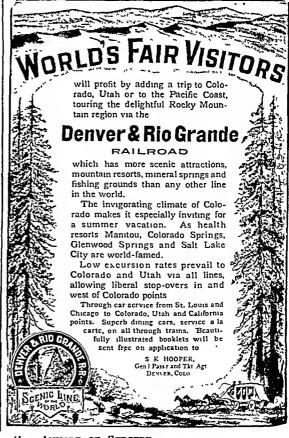
Not Controlled by any Foreign Chemical House.

CLEAN WOUNDS always heal without suppuration and INFECTED WOUNDS quickly become CLEAN WOUNDS when EUSONA is used as a dressing.

All septic conditions are promptly and favorably influenced by the internal administration of EUSOMA, which has well been termed the "great corrector of blood dyscrasia."

This space does not permit more than a hint at the therapeutic value of EUSOMA, but our booklet giving EXACT formula and full description of the remedy will be sent to physicians upon application—also sample, postpaid, for the asking.

The EUSOMA PHARMACEUTICAL Co. cincinnati, ohio.





RITTETREATMENTOF

NECTENZA SVEUMONIA

Mareter and SPECIFIC BACTERIUM TURIC ACID POISONING, ISTA DE COMPERCION DO DEMONSTRADO

PRINT & URK ACID SOLVENT PRIOPERTIES.

ormaldenyde without any of their faults.

WAS HULDISTRESS THE STOMACH

ORGANIC CHEMICAL MEG. FO

THE PARTY OF THE P

The Winkley Artificial Limb Co.

LOWELL E. JEPSON, M. S., President. J. H. JEPSON, Secy. and Treas.

JEPSON BROS., (Sole Owners.)

Largest Manufactory of Artificial Legs in the World.



Manufacturers of the Latest Improved Patent Adjustable Double Slip Socket

ARTIFICIAL LEG

With SPONGE RUBBER, Mexican Felt, or English Willow FOOT Warranted Not to Chafe the Stump PERFECT FIT GUARANTEED

From Casts and Measurements WITHOUT LEAVING HOME.



For Amputation Six Inches Below the Knes

Thousands of our Slip Socket Legs now being worn. U. S. Government Manufacturers, Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN., U. S. A.

THE ONE REMEDY

which experience provès is free from detrimental effects is

GRAY'S Glycerine TONIC Comp.

Try it in convalescence, respiratory disorders, anaemia, malnutrition, nervous exhaustion.

THE PURDUE FREDERICK CO.,
298 Broadway, New York

Annals of Surgery

Vol XLI

FEBRUARY, 1905

No a

ORIGINAL MEMOIRS.

ACID INTOXICATION ITS SIGNIFICANCE IN SURGICAL CONDITIONS

BY JAMES A KELLY, MD,

Farmer House Surveon Boston City Hospital

The condition of acid intoxication observed in surgical cases has been brought forcibly to our notice, during the past year, by a series of cases occurring at the Boston Children's Hospital and Boston City Hospital. In the present article I wish to call attention to those occurring at the latter hospital during my service as house surgeon. I am indebted to the members of the surgical staff, in whose services these cases were observed, for their kind permission in allowing me to report this series.

In a review of the literature of the subject I find series of cases reported by various writers which I feel sure are identical with those I am about to report. While they have been reported under other headings, they have been practically identical in clinical signs and results with those observed at the Boston City Hospital, and, while the mortality in the latter series has not been so great, there is no doubt but that they represent but one disease. While I do not pretend to explain the cause of the condition found in these cases, I feel sure that by presenting this series, I will contribute to a subject which will

eventually receive most careful attention in medical as well as in surgical cases, and perhaps stimulate to some extent physiological, clinical, and pathological investigation in this most interesting subject.

While not claiming that the term acid intoxication definitely describes the condition present, I feel that it will serve until the etiology of this puzzling disease has been definitely determined. Under this term are to be included all those cases which have been reported under the headings of 'Acetonuria, Acetonæmia, and Aciduria. In presenting this series there has occurred some clinical evidence of the existence of a form of acid intoxication which is apparently due to some disturbance in the body metabolism, and all the cases present in the urine acetone and diacetic acid, either separately or together.

This report is based upon the observation of about 400 surgical cases during a period of four months. The urine of these cases was examined (I) immediately upon entrance to the hospital; (2) within twelve to forty-eight hours after the administration of a general anæsthetic; (3) if at any subsequent time clinical signs suggested this condition, or the urine showed the presence of acetone or diacetic acid; and (4) the urine was examined in most cases every other day until the clinical symptoms had ceased and the urine no longer contained a pathological amount of acetone or diacetic acid. Of the 400 cases observed, symptoms of acid intoxication were present in forty-six. In some of these grave symptoms were present; in others, excepting a slight odor to the breath, there was nothing clinically to suggest this condition, and in several acetone and diacetic acid was only discovered in the urine by routine examination on entrance.

History.—The importance of this acid intoxication, produced in the organism by some metabolic change, has been recognized by a study of the intoxication occurring in diabetes mellitus. The coma found in this condition was thought to be due to the presence of acetone in the blood, and that the latter was never found excepting in diabetes. Of late years, however, it has been shown that acetonuria occurs in conditions

independent of diabetes, and that the presence of acetone and diacetic acid is probably a manifestation of the intoxication due to various fatty acids following some pathological change in metabolism

Acetone was first recognized as a pathological constituent of the urine in connection with diabetes, by Petters, in 1857. In the same year Kaulish reported a series of cases of diabetes in which he found acetone present in the urine of a number of cases, and considered the occurrence of coma to be due to acetonæmia. This theory was disputed by Kussmitul in 1874, who doubted the toxic action of acetone to be the cause of diabetic coma. At a later period Gerhardt and others demonstrated conclusively that acetone was associated with diacetic acid and β-oxybutyric acid in the urine and blood of diabetic patients.

It has long been recognized that diabetic patients are poor subjects for anæsthesia, especially when their urine contains acetone Becker, in 1894, reported three fatalities following anæsthesia in diabetic patients, in which acetoniiria was present at the time of the operation He considered that death was due in these cases to some cause common with the production of acetonuria, and later he examined the literature and found twelve cases in which death resulted in diabetic patients, following antesthesia. He was led to believe, therefore, that diabetic patients although showing no clinical symptoms of a grave condition previous to operation were liable, owing to some change in the process of metabolism, to pass into a condition of coma and death Brewer, in 1902, reported a fatal case of appendicitis in which he ascribed the cause of death as due to acetonæmia Guthrie, in 1903 reported a series of cases in which death occurred following the administration of chloroform in children, in which autopsy showed the condition of fatty liver to be present. While he did not suspect the presence of acetone and diacetic acid in the urine, his description of the cases showed a set of clinical symptoms similar to those about to be described in the present article Brackett, Stone. and Law, in July, 1004, in a report from the Boston Children's

Hospital, under the title of "Aciduria associated with Death after Anæsthesia," presented a series of fourteen cases in which death was undoubtedly due in the five fatal cases to an acid intoxication. From this list of clinical evidence of the presence of a, so far undetermined, cause in some cases of death, it can readily be seen that at times there exists a condition, not always recognized, that will have great weight in estimating the degree of a favorable prognosis in surgical cases. This condition of acid intoxication was formerly thought to occur only in fatal cases of diabetes; but late researches, including those cited above, prove conclusively that the condition is entirely independent of diabetes, and moreover that acid intoxication should be considered as a distinct lesion.

As all the cases in the literature of the subject have been presented under the term of acetonuria, and as this condition is present only as a symptom of acid intoxication, it will be used for the time being as synonymous with the latter condition.

An excess of acetone and diacetic acid in the urine has been recognized in the following diseases: (1) in the late stages of diabetes mellitus; (2) in starvation; (3) in malignant growths; (4) in digestive disturbances; (5) in septic processes, general or local; (6) in infectious fevers; (7) in pregnancy, associated with a dead fœtus; (8) in certain psychoses; (9) in autointoxications; (10) in chronic morphinism; (11) in phosphorous poisoning; (12) following general anæsthesia; (13) in injuries to the cerebrospinal system; (14) in shock due to injury; (15) in cases associated with fatty liver, and (16) probably in cases of uræmia. It has been produced experimentally by the administration of phlorizin, and by extirpation of the pancreas and solar plexus.

The presence of acetone (0.02 gramme in fifty ounces) as a normal constituent of the urine has been proven by physiologists. It is also excreted by the lungs and a very small amount is contained in the fæces. (Schwarz, L. Müller.) The amount of acetone in the urine may be increased by the administration of oleic acid, as shown by Joslin. He administered

to a patient 100 grammes of oleic acid, and found that in the twenty-four hours there were excreted 1700 milligrammes of acetone

That the amount of acetone excreted is no indication of the severity of the acid intoxication present is shown by Brackett, Stone, and Law in the series of cases reported from the Boston Children's Hospital In one of their fatal cases the total excretion of acetone in the twenty-four hours was approximately 142 milligrammes, and, while it is considerably more than normal, cases of diabetes have been reported in which the daily excretion of acetone was 100,000 milligrammes

Acetone was considered by Kussmaul to be the toxic agent, but from the foregoing statement of Brackett, Stone, and Law, and from the fact that acetone has been found in the blood in large amounts, and has also been experimentally used in animals in considerable quantities without any toxic symptoms occurring we are obliged to look for some other cause of this acid intoxication

Naunyn considers the condition of acetonæmia as not due to the presence of acetone in the blood, but that it is an acid intoxication resulting from various fatty acids in combination with diacetic and β -oxybutyric acids

Brackett, Stone, and Law found in all their fatal cases the presence of fatty liver, and considered that this condition may have some influence in the production of the intovacation. Their autopsy findings were similar to those of Guthiw, and in one case of the series here reported the autopsy showed the presence of fatty liver. They, however, considered that fatty liver was not a sufficient cause for death, but that it, in connection with the acetonuria, was but the result of an acid intoxication, which also caused an excessive process of oxidation in the blood with resulting lack of oxygen, and that the three conditions combined may have had something to do with the fatal results. This apparent lack of oxygen is borne out by the statement of Brewer, in describing the "air hunger" found in this condition, which "was evidenced by increased rapidity and

depth of respirations, with a bright red color of the mucous membranes and the skin, due to the presence of aërated blood in the veins from inability to absorb carbon dioxide from the tissues."

In a study of these cases, it is apparent that, following some profound change suddenly taking place, the cause of which is not yet determined, there occurs a rapid change in the body metabolism, which is shown by the presence in the urine and blood of acetone, diacetic and β -oxybutyric acids in varying quantities, associated with clinical signs and autopsy findings which have been similar to a more or less degree in all What the cause is operating to produce this change in the body metabolism has not yet been determined; whether it is due to an increased destruction of proteid matter, as Heurter claims, it nevertheless remains that the condition termed aciduria, acetonuria, acetonæmia, is doubtless one of a severe acid intoxication. Edsall claimed that no specific toxic agent is at work, but that the condition is due to an excessive amount of acids due to the reduction of the alkalinity of the tissues and body fluids, and that this was produced by the acids carrying off the alkalies in combination with them, and proposed as a rational treatment the administration of large quantities of alkalies to neutralize the excess of acids present. In the severe cases of the present series large quantities of bicarbonate of soda were given by mouth, intravenously and by rectum, without any amelioration of the clinical symptoms or any production of alkalinity of the urine.

None of the theories offered so far have been thoroughly satisfactory in explaining the cause of this condition of acid intoxication. While I do not attempt to explain the cause of the symptoms present, I would like to call attention to theories, that have been advanced of late, as to the causation of uræmia and eclampsia; and it may be, as our knowledge advances, there may be a similar etiological factor in the class of cases reported and uræmia and eclampsia. Landois, in speaking of the cause of these later conditions, considers that they may be produced by the action of a toxin or toxins on what he calls

the psychomotor centres of the brain, and that at times there is a mechanical pressure on the same cortical centres He has shown that toxins and other substances may produce all the symptoms of uraemia by local cortical action Weisenberg found in two cases of uraemia, bemiplegia, extensive chroma tolysis of the Betz cells of the paracentral lobe, and that cells in the anterior horns of the cord, medulla, cerebellum, and fibres of one motor tract showed pathological changes Will son considers that the toxin theory cited above may play some part in the etiology of uramia and eclampsia, and that there is another important influence at work in the form of intrais another important influence at work in the form of intra-cranial and probably localized pressure on the psychomotor centres, and in support of this theory reports three cases Tyson, in the discussion of Willson's paper at the meeting of the American Medical Association, June 9, 1904, thought that some toxic agent might be considered as responsible for the condition. Lambert, at the same meeting, considered that the lesions found in eclampsia to be identical with those of acute yellow atrophy of the liver He also said that he has always noticed the apparent identity of the condition found in acute yellow atrophy of the liver and uræmia, that there was in uræmia signs of intracranial tension, and that apparently the same toxemia was present in both conditions

It may be that the condition of acid intoxication, whatever its cause, may be due to one similar to that found in uramina and acute yellow atrophy of the liver. While the autopsy reports of the fatal cases at the Boston Children's Hospital do not show any evidence of intracramal pressure, yet the clinical symptoms in some of the cases were certainly those of cerebral pressure, and all were associated with fatty liver. In Guthrie's series the autopsy reports of the fatal cases showed the condition of fatty liver and clinical signs of cerebral pressure. Several cases of this series observed at the Boston City Hospital were undoubtedly due to some cerebral lesion, and were treated as cerebral concussion. Whether the theory of intracramal pressure has any bearing in the production of the symptoms of acid intoxication will only be determined by a study of future cases and experimental research.

Tests used for Acetone and Diacetic Acid.—The test used for determining the pressure of acetone in the urine is as follows: To five cubic centimetres of urine are added a crystal of sodium nitroprussiate and sufficient sodium hydrate to render the solution strongly alkaline. This is thoroughly shaken up in a test-tube. On the addition of glacial acetic acid, the presence of acetone is shown by the occurrence of a purple color to the foam.

The presence of diacetic acid is shown by a Burgundy red color appearing on the addition of a strongly aqueous solution of ferric chloride to the urine.

No quantitative examination of the urine was made in any of the cases of the series, but the amount was roughly determined by the depth of color occurring in making the qualitative tests.

Statistics.—Of the 400 cases observed at the Boston City Hospital, symptoms of acid intoxication were present in forty-six. Of the forty-six cases, acetone and diacetic acid, separately or combined, were found in the following conditions: II cases of appendicitis; I4 of contusions and fractures; 2 of gastric disease; 2 of carcinoma; 3 of severe lacerated contused wounds; 2 of localized septic processes; 2 of cerebral concussion; I of salpingitis; I of acute multiple suppurative osteomyelitis; I of floating kidney; I of fæcal fistula and enterocolitis; I of epilepsy; I of tuberculous cervical noditis; I of burns and typhoid fever; I of diabetic gangrene; I of hæmorrhoids, and I of alcoholism.

In seventeen cases symptoms were present on entrance; in twelve cases, within twenty-four to forty-eight hours after the administration of a general anæsthetic, ether being used in ten cases and nitrous oxide in two cases; in seventeen cases symptoms were not present at time of entrance, but developed later without any anæsthetic being administered, and for which no cause could be assigned. Acetone and diacetic acid were present in the urine at the same time in twenty-four instances; acetone alone was present in twenty cases; diacetic acid alone occurred in two cases; acetone, diacetic acid, and sugar were

present together in three cases, and acetone and sugar were together present in one case In these forty six cases there were six deaths

Symptoms —In those cases in which the condition devel oped a number of days after entrance and the onset could be carefully noted, the first symptom to attract attention was a peculiar apathy This was accompanied by a marked sweetish odor to the breath, a distaste for food, slight increase in the body temperature, and in most cases vomiting

The odor to the breath was of a peculiar, pungent, fleeting odor, or that of acetone, which at times suggested chloroform. In some cases it was very faint and could only be detected very close to the patient's mouth, in others it would be so strong as to be noticeable quite a distance from the patient's bedside. The odor became so characteristic of the condition, that after a time, when apparently there was no other symptom present, and nothing else to indicate the condition of acetonium, on going to the bedside and catching the faint peculiar odor, it could be definitely stated that an examination of the urine would show the presence of acetone and diacetic and

The vomiting would occur without apparent cause, would follow immediately on taking anything into the stomach, in the mild cases it was colorless, copious and watery in character, having a foul acid odor, contained particles of semidigested food, and in the severe cases was dark, bile-stained, of a "coffee ground' appearance, and continued so until death The pulse was increased in rapidity, of decreased tension, and in some cases became very weak. An absence of fever was noticeable excepting in severe cases, when the temperature would reach 102° to 103° Alternating with the apathy there would be periods of restlessness, during which the pa tient required constant attention lest he fall out of hed or tear off his dressings. The face would be alternately pale or flushed, and at times expressive of considerable anxiety. In the fatal cases consciousness usually remained until near the end From periods of restlessness, the patient would sink into a condition of stupor, or become delirious, the vomiting would

cease, cyanosis generally occurring just before death, and the respiration and the pulse gradually failed, the latter often becoming imperceptible just before breathing ceased. Several cases complained of photophobia and dimness of vision, notably Case XL.

The urine in the fatal cases was always diminished in amount, at times turbid, of high specific gravity, and in several cases contained a trace of albumen.

In the mild cases the patients complained of being drowsy and weak. There was a marked odor of acetone to the breath in all cases. The vomiting varied in amount and was not present in all cases. The tongue was dry, clean, and red. The urine always contained acetone and diacetic acid separately or together. These symptoms would last from two to three days, and usually without any special treatment, excepting the exclusion of mouth feeding, would disappear.

A number of cases in which symptoms were present on entrance were those that had sustained an injury. These cases were usually dull, apathetic, had the peculiar odor to the breath, occasionally slight vomiting, and the presence in the urine of acetone and diacetic acid. This condition would last twenty-four to forty-eight hours, and suddenly all symptoms would disappear, and the examination of the urine would show the absence of acetone and diacetic acid. Just what bearing the injury had upon the etiology of the condition it is impossible to say, excepting that there may have been some cerebral congestion present to account for the symptoms.

The case operated on for floating kidney was noteworthy for the fact that the condition did not appear until after operation, and it may be that the resulting active congestion of the kidney had some influence in the formation of toxins, which should have been eliminated by that organ, and which caused the resulting train of symptoms.

A number of cases developed symptoms after they had been in the wards many days. In these the condition could not be ascribed to injury, anæsthesia, or diet. Their mode of life in the wards was similar to that of other patients, and some of the cases had entirely convalesced and were awaiting their dis charge. While most of these cases occurred in children, no cause can be assigned for its development.

Treatment -In the mild cases, in many instances, there was no special form of treatment adopted. If vomiting occurred, mouth feeding was prohibited, and if the condition lasted several days, nutrient enemata were given every four to six hours Other mild cases were given bicarbonate of soda in large doses, but apparently without any marked relief in the symptoms, as compared with those not treated in this way. In the severe cases bicarbonate of soda was given by mouth, if retained, by enemata, subcutaneously and intravenously, and while for a short time there was some hope of this form of treatment doing good, it was usually of but temporary relief In fact, in the severe cases the urine nearly always remained acid in spite of treatment In addition the severe cases were treated symptomatically The best results were obtained by the use of adrenalin chloride, as shown in Case I This was given subcutaneously every eight to twelve hours, in children about 200 cubic centimetres of a 1-50 000 adrenalin saline solu tion, in adults 500 cubic centimetres, were used. The effect of this was shown by a marked increase in tension and slowing of the pulse, the cyanosis present would be replaced by a rather excessive ruddy appearance, the apathy would become less, and the general condition markedly improved. The effect of this stimulation would last three to four hours, and, while it was not given simply on account of the acid intoxication, it was followed by such good results as shown by the improved gen eral condition that in all severe cases it was eventually used To relieve the thirst, enemata of salt solution were given every six hours, alternating with nutrient enemata

From a study of the cases, it is impossible to say that any special treatment had any direct effect upon the condition present, and the results obtained depended upon stimulation and symptomatic treatment

The cases in detail are as follows

CASE I.—Acute Appendicitis.—O. M.; aged nine years; school-boy. Admitted May 16, 1904. Service of Dr. H. W. Cushing. Family History. Negative. Previous History. Pneumonia three years ago, followed by measles and bronchitis. Severe cough the past four to five months.

Present Illness.—General malaise beginning three days ago. Vomiting began two days ago and has continued. Complained of feeling feverish yesterday. General abdominal pain began yesterday, localized in right iliac fossa this morning. Patient unable to retain anything by mouth during the past two days. Mother has noticed peculiar odor to breath the past two days.

Physical Examination.—Well developed and nourished. Face anxious and pale. Extremities cold. Pupils react equally to light. Tongue dry, red, thin yellowish coat. Mucous membrane pale. Sweetish odor to breath. No general glandular enlargement. Pulse equal, regular, of fair volume and tension, 160. Heart and lungs negative. Abdomen markedly retracted. Considerable tenderness over McBurney's point. Moderate spasm over entire right side of abdomen. General condition critical. Leucocytes, 31,400. Strychnine sulphate, ½0 subcutaneously, given on entrance on account of patient's condition.

Operation.—May 16, 1904, one hour after entrance. Ether. Dr. Cushing, Dr. Kelly. Vertical incision about two and one-half inches at outer border of rectus muscle, upper angle at level of umbilicus. On opening peritoneum, intestines found to be collapsed and of a grayish red color, suggesting condition found in a cadaver. Appendix retrocæcal and running upward, entirely free, slightly enlarged, and serous coat slightly injected; slight increase in circumference at middle. Appendix removed and stump touched with carbolic acid (95 per cent.) and alcohol. As condition of appendix did not seem to account for patient's serious condition, entire abdomen was explored, but nothing abnormal found. Abdominal cavity filled with normal salt solution. Sterile gauze wick to pelvis and a second one to stump of appendix. Incision closed with through-and-through interrupted silkworm gut except at point of drainage.

On opening appendix there was found, about two centimetres from tip, an area about one centimetre in diameter, of slight ædema and redness of mucosa, lumen of appendix containing a grape seed. Patient's general condition was so grave after operation that he was given subcutaneously 250 cubic centimetres (1-5,000) adrenalm salt solution, which was followed shortly by marked improvement in pulse and general condition. Very restless after operation. Urine obtained before operation showed, color, pale, specific gravity, toils, reaction, acid, no albumen, no sugar Acetone present, diacetic acid absent.

May 18 Since operation sweetish odor of breath continues Patient mildly delirious and at times very drows. Adrenalm salt solution, 250 cubic centimetres (1-50,000), given subcutaneously every twelve hours. Urme contains acetome and diacetic and Vorniting continues. Addomen not distended. Placed on nutrients. Peptonized milk six ounces, brandy, two ounces, salt solution, two ounces, egg, one, Tr opii deod, gtt. iii.

May 19 Leucocytes, 11,400

May 22 General condition markedly improved Pulse-rate has gradually fallen to 120 Adrenalin salt solution continued every twelve hours subcutaneously Still occasional vomiting Acetone and diacetic acid present in urine Odor of acetone still on breath Delirium absent although patient is still drowsy and resists dressing daily. Wieks started on third day and gradually shortened daily.

May 23 Leucocytes, 12,400

May 26 Soda bicarbonate, gr xxx, every two hours by mouth Nutrients and adrenalin continued Still occasional vortining Patient much brighter since last note Pulse rate steadily rising Vorniting continues Slight delirium jesterday. To day expression is dull, patient sleeping most of the time, refuses everything by mouth. Odor present on breath. Actione and diactic acid still present in urine. Soda bicarbonate, two ounces, given intravenously jesterday and to-day. Adrenalin and nutrients continued. Dressing changed daily. Two wicks. No abdominal distention. Patient slowly failed and, in spite of active stimulants, died at 11 05 p v.

No autopsy Examination of liver at time of operation apparently normal

The effect of the continued use of adrenalin salt solution is shown in the appended temperature chart—It was given every twelve hours from time of entrance—The pulse-rate remained

THE BOSTON CITY HOSPITAL To Sagual

GLINIGAL GHART

1°11°	7		4	_			-	23.	_		l	1:											-					+-
3° - 3° - 2° - 1° -	7		33.50	M	\Box	\neg		al N		4		7 25 25 25 25 25 25 25 25 25 25 25 25 25	-	_								_	-		-			-
3° - 3° - 2° - 1° -	7	7	- j-	٠٦		\dashv		10 LESS		Stephol		Broked																F
2° ქ			+	1	1							E																F
· • 11~	:.				_d	, :			=		7	-	172															
noin	1	1	= -	1	/	ن د مر	7	1	2 0		Į.																	
8°37	a 2		<u></u>			- : - :	===		-	<i>\\</i>	3	1											<u>:</u>					_
634	-			<u> </u>		, ,	;-		7		ē	•	-13 -17															_
ay ,			30		200	4 20	100			D. 1. II	٠ ع	نڌ	23:														_	_
tal 3	977	3	V	~\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	71	हाका ११	Ξ		7 4	2.0	11:	6	21															
40		-	1	Z						j		1	7															
20 10	\dashv	1	$\frac{1}{1}$	_	V	_	_	L	1	 K	1																	_
90 90		\dashv	\dashv			1	2	Y	+	-		-				上												-
80 70		\dashv	+	_	-		+		+	-		-	-			+	-	-	-									-
60 50							+	The same of	+			T						-	-									-
40						E	1	I	1	+			T			E	E	E										
30 25	-	r ^A	3 B	1		-	$ar{ar{\Box}}$				-					$ar{ar{ar{ar{ar{ar{ar{ar{ar{ar{$									_		_	-
20 15		10	2		1	1	1	4	-	1	1	1	1	-													10	-
	7° 50 10 20 20 10 00 80 70 60 35 30 25 20 25 20	8	7° 0 60	7° 0 60 70 70 70 70 70 70 70 70 70 70 70 70 70	7° 0 60 7° 0 7° 0 7° 0 7° 0 7° 0 7° 0 7°	7 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	76 60	70	70 60 70 60 60 50 45 40 35 30 25 20 15	70 60 70 70 70 70 70 70 70 70 70 70 70 70 70	70 60 1 2 2 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2	70 60 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	70 60 70 70 70 70 70 70 70 70 70 70 70 70 70	70	70	70 60	70 60 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	70	70	70	70	70	70	7	7	76	7 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	7

at 160 for four days, then gradually decreased, and at time of death was only 120

Throughout the entire course of the disease the patient remained conscious, although periods of apathy alternated with those of extreme restlessness, during which he would utter the most piercing shrieks, required most careful watching, and at times of changing his dressings it was impossible to do so with any degree of asepsis. The odor of acctone could be noticed throughout the room at all times. The urine the last four days was very much diminished and of fugh color.

Case II —Contused Lacerated Wound of Foot (Measles)

—A S, aged four years Admitted May 27, 1904 Service of
Dr H W Cushing

Present Illness — While mother was getting on car, the latter started, and child's foot caught under wheel

Physical Examination—Negative save for local condition On dorsum of foot is a continued lacerated wound extending down to tendon sheaths, an irregular lacerated wound on plantar sur face extending from toe to heel Considerable laceration of plan tar muscles Compound dislocation of first phalingeal joint of great toe Fracture of proximal phalanx of fifth toe

Operation—May 27, 1904 Ether Dr Kelly Repair under aseptic conditions Great toe amputated at terminal joint, fifth toe at metatarsophialangeal joint Sterile dressing Plaster-of-Paris bandage

Examination of urine day after operation Color, pale, specific gravity, 1025, albumen and sugar absent Acetone and diacetic acid present Odor of acetone to breath No other symptoms

May 31 Acetone present (slight) Diacetic acid absent

June 3 Actione and diacetic acid absent.

June 10 Patient developed measles, and was transferred to South Department No special treatment

CASE III—Fracture of Femur Refracture (Measles)— L N, aged four years Admitted April 21, 1904 Service of Dr H W Cushing Previous History Fracture of femur, August 11, 1903 Discharged in October, 1903 Using leg past two months without crutches Present Illness.—Patient fell to-day, April 21, 1904, and refractured femur. Given ether for reduction and immobilization. Urine examined April 21 and May 20, 1904, acetone and diacetic acid present.

June 15. Loss of appetite. Patient drowsy. No delirium. Odor of acetone to breath. Urine examined and found to be as follows: Pale; 1027; acid; albumen and sugar absent. Acetone

and diacetic acid present. No special treatment.

June 18. Measles developed. Patient apathetic, vomited several times. Marked odor of acetone to breath. Drowsy, no delirium, urine scanty, high colored. Acetone and diacetic acid present.

June 20. Discharged to parents, as latter refused to allow child to go to South Department.

CASE IV.—Appendicitis; Diffuse Peritonitis.—M. F.; aged eleven years; school-girl. Admitted May 11, 1904. Service of Dr. H. W. Cushing. Family History. Negative. Previous History. Negative.

Present Illness.—First symptoms evening of May 10. Pain in epigastrium leaving this region and centring at McBurney's point. Nausea, vomiting. Temperature, 99.5° F.; pulse, 100.

Physical Examination.—Abdomen slightly distended, spasm entire right side, tenderness on pressure, greatest at McBurney's point. Leucocytes, 19,200.

Operation.—May 11, 1904. Ether. Dr. Cushing, Dr. Kelly. Fifteen hours after onset of symptoms. Vertical incision outer border of rectus muscle. Appendix up and outward behind cæcum, united to cæcum by newly formed adhesions, serosa covered with fibrin, appendix generally enlarged, no perforation. Free cloudy fluid in pelvis and extending upward on right side about appendix. Appendix removed, abdominal cavity irrigated with normal salt solution, and drained with sterile gauze wicks. Culture from fluid in pelvis showed streptococci and Bacillus coli communis. Good recovery from ether. Good convalescence. Urine negative until June 22, when acetone and diacetic acid were found. Two days previous patient gradually became drowsy, and, although she had been up and about the ward for from seven to ten days, went to bed. Marked odor of acetone to breath, vomiting, inclined to sleep. Placed on liquid diet. Patient given soda bicarbonate, gr.

xxx, every two hours until she was unable to retain anything in stomach

June 28 General condition has improved, vomiting stopped, although patient was still anotheric and had slight odor of acetone to breath

July 1 Still slight odor to breath, no other symptoms Patient discharged to father on request

CASE V -Fracture of Femur - C E S, aged twenty three years, hostler Admitted March 26, 1004 Service of Dr H W Cushing Family History Negative Previous History Nega tive

Present Illness - Yesterday while at work, a bale of hay fell three stories to the sidewalk and bounced, striking patient under the chin, patient was thrown out into the street, sustaining fracture of right femur, and was rendered unconscious Ether given March 27, and Buck's extension apparatus applied

March 28 Urine color normal, 1025, acid, no albumen, no sugar

April 7 Urine color normal, 1030, no albumen, sugar, one per cent No acetone No diacetic acid present Patient drows. Loss of appetite thirst nausea, no vomiting. No odor to breath

April o Urine again examined on account of clinical symp toms Color normal 1030 Slight possible trace of albumen, sugar, one per cent Acetone and diacetic acid present, present until April 14 when acetone and diacetic acid were absent from urine, and symptoms disappeared Soda bicarbonate given

May 14 Discharged relieved

Case VI -Fracture of Femur -W E D , aged eight years, school boy Admitted March 17, 1904 Service of Dr H W Cushing Family History Negative Previous History Negative

Present Illness -- Patient fell off fence eight feet to ground, fracturing right femur Ether given March 17 and Buck's exten sion applied

May 17 Up and about ward

May 20 Patient began vomiting, became drowsy, odor to breath, thirst

May 22 Urine, pale, cloudy, 1021, acid Albumen very slight trace Sugar absent Acetone present Diacetic acid absent; urine remained about the same until May 30, when acetone disappeared. Soda bicarbonate given until urine became alkaline.

May 30. Discharged to parents relieved.

CASE VII.—Colles's Fracture.—M. I. F.; aged fifty-seven years; single; housework. Admitted June 2, 1904. Service of Dr. G. H. Monks. Family History. Negative. Previous History. Negative.

Present Illness.—Patient tripped and fell on hand, receiving a Colles's fracture. Given nitrous oxide for reduction of fracture. Urine, June 2, after anæsthetic, color normal; 1022; acid; no albumen; no sugar. Acetone absent, diacetic acid present. No clinical signs.

June 3, 1904. Discharged relieved.

Case VIII.—Abscess of Leg.—M. S.; aged thirty-one years; single; pickle-packer. Admitted June 2, 1904. Service of Dr. F. S. Watson. Family History. Negative. Previous History. Negative.

Present Illness.—Leg ulcer for past five years, which has at times been healed. Abscess of leg, inner side, above internal malleolus.

June 2. Urine, high color; 1020; acid; no albumen; no sugar. Acetone absent, diacetic acid present.

Operation.—June 4, 1904. Ether. Dr. Hollister. Abscess incised. No clinical symptoms after operation, excepting slight odor to breath, which continued for two days. No special treatment.

June 5. Urine, color normal; 1019; acid; no albumen; no sugar. Acetone and diacetic absent.

July 29. Discharged relieved.

Case IX.—Gastric Ulcer. (Gastro-enterostomy, Posterior.)—A. D.; aged thirty-one years; married; female; housework. Admitted June 11, 1904. Service of Dr. J. B. Blake. Family History. Negative.

Previous History.—Abdominal distress after meals, eructation of gas, and constipation for several years. Catamenia irregular (four to six weeks), very painful, and accompanied by vomiting. One year ago similar attack to present illness.

Present Illness.-For past five weeks patient has vomited

almost immediately on ingestion of food Considerable abdominal pain not localized Vomitus consisted of non digested food

Physical Examination -Slight epigastric tenderness Pul-

sation of aorta easily felt No evidence of aneurism

Treatment—Nothing by mouth but cracked ice Nutrients every six hours Suds enema daily

June 12 Urme negative

June 15 Nauseated at times since entrance Yesterday, four minims 4 per cent solution cocaine, and five grains cerium oxalate every four hours for control of nausea No vomiting to-day, shelt nausea during night

June 19 Vomited at times, vomitus being streaked with blood, cocaine and cerium oxalate omitted on account of irrita-

tion Bismuth tried and omitted

June 23 Light diet without discomfort No nausea

June 27 Operation Ether Dr Blake Gastro enteros-

tomy, posterior

June 28 Pulse, 120, poor quality Patient vomited two ounces of bright blood Patient given beef-juice in two-ounce doses As this caused nausea, it was omitted Again vomited blood Morphine and adrenalin solution subcutaneously

June 29 Abdomen distended Pulse, 140, temperature, 100° F Wound dressed, clean Distention less at 6 P M Adre nalm solution again given, followed by improvement in pulse, then 120 Urine to day showed presence of acetone Diacetic acid absent Pale, 1013 Trace of albumen

June 30 Patient died, vomiting continuing until death. No

trace of acetone in urine obtained post mortem

No autopsy performed

CASE X—General Confusions—E T P, aged sixty-five years, widower, no occupation Admitted June 25, 1904 Service of Dr F S Watson Family History Negative Previous History Treated five years ago for diabetes Convulsions at irregular intervals since

Present Illness —Patient fell yesterday on stairway (Sullivan Square subway), striking head on rading Unconscious until ambulance arrived, about twenty minutes

Physical Examination, Local—Small lacerated wound of face and forehead, aseptic dressing No anæsthetic given Urine, pale, 1031, acid, no albumen, sugar, 2 per cent Acetone and diacetic acid present. Slight odor to breath; no other symptoms. Examination of urine remained unchanged the day of discharge. No special treatment.

June 29. Discharged relieved.

Case XI.—Floating Kidney.—E. F.; aged twenty-nine years; married; housework. Admitted June 9, 1904. Service of Dr. J. B. Blake. Family History. Negative. Previous History. Symptoms of floating kidney for past fourteen years.

Physical Examination, Local.—Easily palpable right kidney. June 9. Urine negative.

June 10. Operation. Nephrorrhaphy. Ether. Dr. Blake.

Urine.	Color.	Specific Gravity.	Re- action.	Albumen.	Sugar.	Acetone.	Diacetic Acid.
June 11 " 12 " 13 " 14 " 15 " 16 " 19	Normal. Normal. Normal. Normal. Normal. Normal.	1019 1018 1020 1019 1019 1019	Acid. Acid. Acid. Acid. Acid. Acid.	Slight trace. Trace. Slight trace. Slight trace. Slight trace. Slight trace. Sl. pos. trace. Sl. pos. trace.	0 0 0 0	Faintly. Very marked. Markedly present. Present. Faintly present. Absent. Very faintly pres.	Absent. Present. Absent. Present. Absent. Absent. Absent.

To determine the effect of trauma to the kidney in this operation in reference to the production of acetone and diacetic acid in the urine, an examination was made daily. The report of each examination is noted above. While acetone and diacetic acid were present in variable quantities, at no time were there any clinical signs of an acid intoxication. The patient had an uninterrupted convalescence.

Case XII.—Appendicitis, Acute, with Abscess.—J. G.; aged sixty-five years; male; married; night watchman. Admitted May 29, 1904. Service of Dr. J. B. Blake. Family History. Negative. Previous History. Negative.

Present Illness.—Four days ago pain in right lower quadrant of abdomen. Vomiting daily since. Diarrhœa from onset.

Physical Examination.—Spasm on right side of abdomen. Indefinite mass, size of an orange, felt in region of appendix. Leucocytes, 16,400.

May 30. Urine, normal; 1024; acid; no albumen; sugar, 1.6 per cent. Acetone present, diacetic acid absent.

June 1, 1904. On account of presence of acetone in urine, general anæsthesia was not considered advisable. Schleich's fluid

used 1-1000 Appendix, abscess found Appendix not removed Abscess cavity drained No symptoms of acetonuria

June 12 Sugar, 1 38 per cent Acetone slight No diacetic

acıd

June 20 Sugar, I 2 per cent Acetone absent Diacetic acid absent Patient convalescing

CASE XIII - Cerebral Concussion - H F, aged seven years, school boy Admitted June 6, 1904 Service of Dr W P Bolles

Present Illness-Patient run into by another boy two days ago, being thrown to ground, striking head Not unconscious Brought into hospital to day on account of drowsiness, incoherence, and slight abdominal pain

Physical Evamination -Slight laceration over occiput A second one over right frontal region. Abrasion of right side of nose Slight abdominal tenderness which is general Odor of acetone to breath Principal symptoms are mental, chiefly drowsiness and inability to think clearly Mistakes are made in counting and in naming objects seen. Vomited several times while in hospital

June 6 Urine slightly pale, 1018, acid no albumen, no sugar Slight amount of acetone present. No diacetic acid Urine examined was the first passed

June 8 No cerebral symptoms Odor of acetone gone

Urme negative Discharged relieved

CASE XIV -Appendicutes, Acute, with Abscess -S B , aged fifty years, widow, housework Admitted June 7, 1004 Service of Dr W P Bolles Family History Negative Previous History Abscess of kidney twenty four years ago (?), told so by physician Stone removed from bladder fifteen years ago

Present Illness - Pain and tenderness over right side of abdomen and vomiting past two days

Present Examination Local—Some spasm and tenderness of right lumbar region extending into back and up towards region of gall bladder. Dulness and resistance in right lumbar region near region of right kidney and extending to region of appendix Point of greatest tenderness in lumbar region, outer border of erector spinae muscles Leucocytes, 18 000 Odor of acetone to breath Patient drowsy

June 8 Urme slightly high and cloudy, 1020, alkaline, no albumen, no sugar Acetone and diacetic acid present

June 15. Urine negative.

June 17, 1904. Operation. Ether. Dr. H. A. Lothrop, Dr. Kelly. Incision outer border of erector spinæ muscles. Abscess cavity containing about two ounces of pus; at bottom of abscess appendix could be felt, and was apparently retroperieoneal. Appendix not removed. Abscess cavity drained. Uninterrupted convalescence.

Tuly 10. Discharged relieved.

CASE XV.—Cerebral Concussion.—J. M.; aged ten years; school-boy. Admitted June 15, 1904. Service of Dr. W. P. Rolles.

Present Illness.—Patient fell off furniture wagon to ground, striking head and abdomen. No subjective symptoms of concussion excepting confusion of ideas for first twelve hours. Odor of acetone to breath on entrance.

June 17. Urine, normal; 1016; acid; no albumen; no sugar. Acetone present; diacetic acid absent.

June 19. Urine negative. No clinical symptoms. June 20. Discharged relieved.

CASE XVI.—Fracture of Humerus; Fracture of Clavicle.— K. B.; aged eight years; school-girl. Admitted June 18, 1904. Service of Dr. W. P. Bolles.

Present Illniess.—Patient fell two stories from a fire-escape, sustaining epiphyseal separation of upper end of right humerus and green-stick fracture of right clavicle. No clinical symptoms of acetone excepting a slight suggestion of odor to breath. Urine. normal in color; 1028; acid; no albumen; no sugar. Acetone and diacetic acid present. No anæsthesia given to apply fixation dressing.

June 20. Urine, color normal; 1026; acid; no albumen; no sugar. Acetone and diacetic acid absent. No clinical symptoms. No special treatment.

June 21. Discharged relieved.

CASE XVII.—Carcinoma of Uterus.—E. P.; aged fifty-five years; married; housework. Admitted June 11, 1904. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Negative.

Present Illness.—Symptoms of uterine fibroid for past five or six years.

Tune 12. Urine, normal; 1023; acid; very slight trace of albumen; no sugar. Acetone and diacetic acid absent.

June 15 Operation Ether Dr Bolles, Dr Kelly Hysterectomy Pathological report shows carcinoma of the uterus near fundus, also several fibroids

June 17 Urine, normal, 1020, acid, no albumen, no sugar Acetone present, diacetic acid absent Acetone odor to breath Slight vomiting for four days after operation, then no signs of acetonuria clinically or in urine Uninterrupted convalescence

July 7, 1904 Discharged relieved

CASE XVIII—Blank Cartridge Wound of Hand—F Q, aged nine years, school-boy Admitted June 17, 1904 Service of Dr W P Bolles

Present Illness —While loading pistol with blank cartridge, the latter accidentally exploded, wounding the hand of the patient

June 17, 1904 Operation Ether Dr Kelly Wound thoroughly curetted, antiseptic precautions Unine passed that night showed color normal, 1022, acid Albumen and sugar absent Acetone and diacetic acid present No clinical symptoms except slight odor to breath

June 20 Urine No acetone or diacetic acid present Culture taken at operation showed absence of tetanus bacillus

June 21 Discharged relieved

CASE XIX—Lacerated Wounds of Hand from Cannon Cracker—M OB, aged nine years, school girl Admitted June 18, 1904 Service of Dr W P Bolles

Present Illness—Patient picked up a lighted cannon cracker, the latter exploding in hand Local examination, compound dislocation of thumb, palm of hand torn, exposing second metacarpal, first finger severely lacerated

June 18 Operation Ether Dr Kelly Index finger amputated at first joint, middle finger at terminal joint Examination of urine passed might of operation was as follows Color, normal, 1024, acid, no albumen, no sugar Acetone and dia cetic acid present Acetone and diacetic acid persisted in urine three days No clinical symptoms

June 29 Discharged relieved

Case XX—Fracture of Ulna—B D, aged ten years; school boy Admitted June 30, 1904 Service of Dr W P Bolles

Present Illness.—Patient, morning of entrance, fell from a fence, a distance of eight feet, falling on left forearm, sustaining a fracture of ulna and lacerated wound of forearm.

June 30. Operation. Ether. Dr. Kelly. Aseptic repair of wound; fracture found not to be compound. Examination of urine passed eight to ten hours after operation showed color pale; 1018; acid; no albumen; no sugar. Acetone and diacetic acid present. No clinical signs. Acetone and diacetic acid present in urine for two days.

July 6. Discharged relieved.

CASE XXI.—Fracture of Tibia.—K. C.; aged twenty-seven; female; single; housework. Admitted July 1, 1904. Service of Dr. Paul Thorndike.

Present Illness.—Two days before admission patient fell down steps and turned on foot, sustaining fracture of middle of right tibia.

July 2. Urine, light color; 1018; acid; no albumen; no sugar. Acetone and diacetic acid present. No anæsthetic given. No clinical signs. Acetone and diacetic acid present in urine for three days.

July 29. Discharged relieved.

CASE XXII.—Acute Multiple Suppurative Osteomyelitis.—G. S.; aged twelve years; school-girl. Admitted April 4, 1904. Service of Dr. H. W. Cushing. Family History. Negative. Previous History. Negative.

Present Illness.—Patient unable to walk for past week on account of pain in right knee. Four days ago right thigh (lower third) and knee increased in size, accompanied by night cries, increased local temperature, pain, redness, and tenderness.

Physical Examination.—Well developed and nourished. Apprehensive. Face flushed. Tongue, white coat and dry. Pulse, 130; temperature, 102° F.

Local.—Right lower half of right thigh swollen, red, deep fluctuation, slight synovitis of knee.

Operation.—April 6, 1904. Ether. Dr. Hubbard, Dr. Kelly. Two lateral incisions over lower thigh, large quantity of pus evacuated. Periosteum stripped from bone. Culture showed pure culture of Staphylococcus pyogenes aureus. Urine, negative.

April 10. Second operation. Ether. Dr. Hubbard, Dr. Kelly. Left upper humerus, incision made and pus outside shaft, four trephine holes made, and pus found in medullary cavity

(culture, Staphylococcus pyogenes aureus) Right lower femur trephined, pus found in medullary cavity (culture, Staphylococcus pyogenes aureus) Left lower femur trephined, no pus found (culture, Staphylococcus pyogenes aureus)

April 13 Third operation Ether Dr Hubbard, Dr Kelly Lower end of right fibula trephined, pus outside bone and in meduliary cavity (culture, Streptococcus pyogenes aureus, Staphylococcus pyogenes aureus, Bacillus subtilis) Blood culture, April 24, 1904, Streptococcus pyogenes aureus

April 25 Parotid abscess incised Ethyl chloride Dr H W Cushing, Dr Kelly

Repeated examinations of urine were made, and until May 9 acetone and diacetic acid were absent. On May 8 there was noticed a peculiar odor to the breath accompanied by drowsiness, vomiting, and increased pulse rate. Examination of the urine revealed the presence of acetone, and on the following day diacetic acid. The patient was given soda bicarbonate, gr xxx, every two hours until she failed to retain anything by mouth, when she was given enemata containing soda bicarbonate, two ounces every four hours, until death which occurred May 20 During the four days preceding death the patient was given subcutaneously 200 cubic centimetres of adrenalin salt solution (1-50,000) with slight favorable results Nutrient enemata and stimulation were freely given During the last four days patient had periods of restlessness alternating with stupor. The tongue remained a reddish color, and at all times was extremely dry On account of screaming and apparent pain, sedatives were required, and towards the end vomiting ceased the patient passed into a state of coma, the urine became very scanty, and death occurred very suddenly Autopsy permission was not granted by parents Patient died May 20

Daily examinations of urine were as follows

Unne	Color	Spec fic Gravity	React on	Albu	Sugar	Acetone	Discette Ac d	Ind can
May 8 13 14 15 16 17	Sl p tly high Pale Pale Cloudy Pale Pale cloudy Pale Pale cloudy Pale Cloudy	1018 1014 1015	Acid Acid Acid Acid Acid Alkaline Acid Acid Acid Acid	000000000000000000000000000000000000000	0 0 0 0 0 0 0	Absent. Present Present Increasing Present Not so marked Present Present Present	Absent Absent Present Present Present Present Present Present Present	Absent, Present Present, Present Present Absent Absent Absent Absent

CASE XXIII.—Appendicitis.—M. S.; aged thirty years; male; married; bricklayer. Admitted June 3, 1904. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Negative.

Present Illness.—Well until three days ago. Pain in left lower quadrant of abdomen, then in right. Bowels constipated. Slight nausea this morning.

Local.—Some tenderness on deep pressure in right iliac fossa. Leucocytes, 10,200. Urine, June 6, normal; 1026; acid; no albumen; no sugar. Acetone and diacetic acid present. Patient refused operation. No clinical symptoms present except odor to breath.

June 6. No symptoms of appendicitis since yesterday. Examination of urine negative. As patient desires to go home, he is discharged.

CASE XXIV.—Compound Fracture of Tibia.—P. H.; aged forty-six years; male; peddler. Admitted June 8, 1904. Service of Dr. F. S. Watson.

Present Illness.—Wheel of ice wagon went over left leg, causing compound fracture of tibia.

June 8, 1904. Operation. Ether. Dr. Hollister. Aseptic repair. Sterile dressing plaster-of-Paris bandage. Urine passed that night showed normal; 1024; acid; no albumen; no sugar. Acetone present, diacetic acid absent. No clinical symptoms present excepting odor to breath.

July 8. No symptoms since operation. Acetone present in urine two days.

CASE XXV.—Fracture of Fibula.—J. G.; aged thirty-three years; male; liair-dresser. Admitted June 9, 1904. Service of Dr. F. S. Watson.

Present Illness.—Patient turned ankle stepping from street to curb. Urine, June II, normal; 1022; acid; no albumen; no sugar. Acetone present, diacetic acid absent. No clinical signs. Presence of acetone discovered in routine examination.

June 12. Acetone and diacetic acid absent.

June 20. Discharged relieved.

CASE XXVI.—Appendicitis, Acute, with Abscess.—J. D.; aged twenty-five years; warehouseman. Admitted June 11, 1904. Service of Dr. F. S. Watson.

Present Illness.—Two days ago pain in abdomen. Vomited

several times during first two days, none since Bowels open Pain decreasing until to day, when it grew worse

Local Examination —Abdomen moderately distended Tenderness and muscular spasm on right, a distinct tender mass in right lower quadrant, region of appendix Leucocytes, 21,400

Operation — June II, 1904 Ether Dr E H Nichols Abdomen opened Appendix found to be long, ruptured, and gangrenous, surrounded by an abscess cavity Urine passed June II showed high, 1035, acid, no albumen, no sugar Acetone present, diacetic acid absent No clinical symptoms No further examination of urine made Uneventful convalescence

CASE XXVII — Diabetes, Gangrene of Foot — G W, aged sixty-six years, expressman Admitted June 10, 1904 Service

of Dr F S Watson

Local Examination—Left hand shows small ulceration of third and fourth fingers Right toe shows ulceration size of dime on inner side of metatrsophalangeal joint. Ulcer clean and surrounded by a reddened area. Left foot, the fourth and fifth toes, all cold and black, in a condition of dry gangrene. Urine, June 15, before operation, normal, 1023, acid, no albumen, sugar present, I 70 per cent. No acetone, no diacetic acid.

Operation — June 15 1904 Ether Dr F S Watson Amputation of left leg just above knee-joint Urine passed June 20, normal, 1036, acid, no albumen, no bile, sugar, 180 per cent

Acetone and diacetic acid present No clinical symptoms

June 26 Examination of urine negative, excepting sugar present 1 per cent

July 10, 1904 Discharged relieved

CASE XXVIII —Appendictis, Acute Catarrhal—N M, aged twenty one years, male, painter Admitted June 20, 1904
Service of Dr F S Watson Previous History First attack six months ago

Present Mness—Sudden pain in abdomen three days ago Bowels constipated until yesterday, when moved by an enema No vomiting Pain is now confined to right lower quadrant of abdomen

Local —Tenderness on deep pressure in right lower quadrant of abdomen No muscular spasm Nothing felt

June 21 Urme normal, 1022, acid, no albumen, no

sugar. Acetone present, no diacetic acid. Slight odor of acetone to breath. Leucocytes, 8800.

Operation.—June 22, 1904. Ether. Dr. F. S. Watson. Appendix found to be in a condition of mild inflammation. Appendix removed.

June 25. Urine negative. Normal convalescence.

Case XXIX.—Fracture of Femur.—A. R.; aged fifty-two years; female; housework. Admitted June 20, 1904. Service of Dr. W. P. Bolles.

Present Illness.—Fell from an electric car, fracturing left femur.

June 21. Urine, normal; 1010; acid; albumen, very slight trace. No casts. Normal and abnormal blood. No sugar. Acetone and diacetic acid present, found in routine examination.

June 23. Urine negative, except slight trace of albumen. No clinical symptoms. No anæsthetic given for application of extension apparatus.

CASE XXX.—Alveolar Abscess.—F. G.; aged twenty-two years; travelling salesman. Admitted May 3, 1904. Service of Dr. A. Post.

Present Illness.—Tooth began to ache seven days ago. Extracted two days ago. Face began to swell six days ago.

Local Examination.—Entire right side of face shows swelling and brawny induration with but little tenderness. Patient unable to open mouth.

June I. Urine, high colored; 1030; acid; no albumen; no sugar. No acetone, no diacetic acid.

Operation.—June 1, 1904. Nitrous oxide. Dr. Hollister. Incision.

June 2. Urine, high; 1030; acid; no albumen; no sugar. Acetone present, no diacetic acid found in routine examination.

June 3. Urine negative. No clinical symptoms.

CASE XXXI.—Appendicitis, Acute, with Abscess.—H. P.; aged twenty-five years; female; book-keeper. Admitted June 17, 1904. Service of Dr. F. S. Watson.

Present Illness.—Three days ago at night sudden onset of cramp-like pains in lower abdomen. Diarrhœa and vomiting. Vomiting continued for three days, vomitus yellow liquid. Diarrhœa lasted twenty-four hours. One movement yesterday, following administration of castor oil. Vomited everything but soda

water taken last night Pain in centre of abdomen continued same as at onset

Local -Slight increased spasm on right Tenderness across

entire lower half of aldomen Leucocytes, 19 000
June 19 Urine (turbid), 1030, acid, slight trace of albunen, no sugar Acetone present, no diacetic acid found in routine examination

June 20 Same as day before, plus presence of diacetic acid No clinical signs except odor to breath

June 21 Tenderness was marked in right lower quadrant

Operation — June 29, 1904 Ether Dr E H Nichols Mc-Burney incision Gangrenous appendix with abscess Appendix removed, dramage

June 29 Urine negative Normal convalescence Acetone present in urine seven days

CASE XXXII — Epilepsy — T S, aged thirteen years, male, no occupation Admitted June 13 1904 Service of Dr F S Watson Family History Negative

Previous History—At thirteen months began to have convulsions, had them until three years old, then none until nine years old Pneumonia nine years ago Malaria five years ago

Present Illness—Since malaria five years ago has had convulsions Attacks come on while standing up, when he will fall, butes tongue During the past three weeks has talked incoherently, and laughs to himself has been getting very weak and losing weight, has several convulsions a day Attacks last from two to three minutes Appetite capricious

Physical Examination —Well developed and poorly nourished Stellate scar in left eyebrow. On right postparited region a tumor three centimetres in diameter closely adherent to skull, over which the skin moves, indefinite sense of fluctuation in tumor Epileptic attacks since entrance. June 14. Urine, cofor normal, 1020, acid, no albumen, no

sugar, no acetone no acetic acid

Operation — June 15, 1904 Ether Dr E H Nichols Tumor dissected out Pathological report, chronic inflammatory

June 18 Urine, normal 1022, acid, no albumen, no sugar, acetone present, no diacetic acid

June 20 Acetone absent

June 27 No convulsive attacks since operation Urine negative Discharged relieved CASE XXXIII.—Tuberculous Cervical Noditis.—H. D.; aged sixteen years; female; housework. Admitted June 3, 1904. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Negative.

Present Illness.—Patient has noticed swellings of both sides of neck since age of nine years, swelling increasing in size every winter.

Local Examination.—Swelling size of small egg just below left ear and another just below this at base of neck. Below right ear there is a fluctuating swelling the size of a walnut.

June 4. Urine, slightly high and cloudy; 1019; acid; no albumen; no sugar; acetone present. No diacetic acid found in routine examination. No clinical symptoms.

Operation.—June 9, 1904. Ether. Dr. H. A. Lothrop, Dr. Kelly. Dissection of glands.

June 8-12. Urine negative. Pathological report, tubercular lymph-nodes.

June 21. Discharged relieved.

CASE XXXIV.—Appendicitis, Chronic, with Adhesions; Inguinal Hernia.—W. B.; aged twenty-six years; physician. Admitted June 10, 1904. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Inguinal hernia for past six years. During the past nine months has had eight attacks of appendicitis.

Present Illness.—Pain, colicky, past four days; tenderness over appendix region, also in lumbar region. No vomiting. No digestive disturbance.

June 10. Urine, normal; 1025; acid; no albumen; no sugar; acetone present. No diacetic acid found in routine examination. No clinical signs.

Operation.—June 18, 1904. Ether. Dr. H. A. Lothrop, Dr. Kelly. Appendectomy. Bassini operation on hernia. Pathological report of appendix, chronic obliterative appendicitis. Uneventful convalescence. Subsequent examinations of urine negative.

July 12. Discharged relieved.

Case XXXV.—Fracture of Radius.—D. S.; aged seven years; school-boy. Admitted June 11, 1904. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Negative.

Present Illness —Patient fell off roof, fifteen feet, to ground, sustaining slight abrasion of face and fracture of lower end of left radius

June 11 Urine, normal, 1025, acid, no albumen, no sugar Acetone present, diacetic acid present in small amount No clinical signs except odor of breath

June 13 Urine negative Ether given two days after admission for reduction of fracture

June 18 Discharged relieved

CASE XXXVI—Fracture of Pelvis—S P, aged fourteen years, male, clerk Admitted June 18, 1904, to Relief Station, Boston City Hospital Transferred to Main Department, Boston City Hospital, June 20, 1904 Service of Dr W P Bolles

Present Illness -Patient is said to have fallen off his team

and been run over by another team

Physical Evamination—Well developed and nourished Pale, hysterical In considerable shock. Pulse rapid and weak Considerable general tenderness of abdomen Voluntary spasm Contusion and abrasion of right flank. Ecchymosis of left groin Crepitus in left pelvis. Considerable swelling of left thigh. Rectal examination shows fracture of descending ramus of left pubis and of fragment in immediate neighborhood of anterior wall of rectium.

June 20 Urine passed, normal, 1023, acid, no albumen, no sugar Acetone present, no diacetic acid No clinical signs except odor to breath June 23 Urine negative July 10 Con valescing

CASE XXXVII—Salpingits—G C, aged twenty-one years, table girl Admitted June 25, 1904 Service of Dr W P Bolles Family History Negative Previous History Colicky pains in lower abdomen at menstrual period

Present Illness —During past month has had occasional slight pain in right lower abdomen, which increased in severity past four days

Local Examination -- Slight tenderness in right suprapuble region, slight vaginal discharge

June 26 Urine passed, normal, 1020, acid, no albumen, no sugar Acetone and diacetic acid present. No chinical signs but odor to breath

June 29 Urine negative Discharged relieved No opera-

Case XXXVIII.—Carcinoma Descending Colon; Intestinal Obstruction.—F. M.; aged twenty-nine years; married; housework. Admitted May 22, 1904. Service of Dr. Paul Thorndike. Family History. Negative. Previous History. Symptoms of gradually increasing obstruction two days before entrance, absolute constipation, vomiting.

May 23. Urine, normal; 1025; acid; slight possible trace of albumen; no sugar; no acetone; no diacetic acid.

Operation.—May 25, 1904. Ether. Dr. Paul Thorndike. Laparotomy. Carcinomatous mass found involving descending colon and sigmoid. Left inguinal colostomy.

June 15. Urine, slightly high; 1020; acid; no albumen; no sugar; acetone present; no diacetic acid. No clinical signs.

June 22. Urine negative. Normal convalescence.

Case XXXIX.—Appendicitis, Acute, with Abscess.—J. C.; aged thirty years; married; driver. Admitted June 29, 1904. Service of Dr. F. S. Watson. Family History. Negative. Previous History. Negative.

Present Illness.—Sudden attack of cramp-like pain in abdomen yesterday morning. Vomited last night. Pain now localized in appendix region. Bowels constipated for past two days.

Physical Examination.—Looks sick. Odor of acetone to breath. Abdomen, scaphoid; marked muscular spasm on right side; great tenderness over region of appendix. Leucocytes, 25,000.

July 1. Urine, normal; 1030; acid; no albumen; no sugar. Acetone present; no diacetic acid.

Operation.—July 2, 1904. Ether. Dr. W. E. Faulkner. Appendix found to be gangrenous and was removed. Localized peritonitis. Drainage. Good recovery and convalescence. Pathological report, culture taken was sterile. Acute gangrenous appendix.

July 5. Urine negative; no further clinical signs; normal convalescence.

Case XL.—Fæcal Fistula.—A. S.; aged forty years; female; baker. Admitted February 8, 1904, to Dr. H. W. Cushing's service.

Patient transferred from Medical Department, where she entered six days ago with history of steady vomiting for three weeks, associated with ingestion of food and slight epigastric pain and tenderness. Vomitus chiefly food material and containing no

blood Seven years ago had an abscess in right groin, which still discharges at intervals Since entrance on medical service patient has had continual vomiting Fed by nutrient enemata

Physical Examination —Well developed and nourished Pu-

Physical Examination —Well developed and nourished Pupils equal and react to light Tongue much reddened and dry Throat reddened No general glandular enlargement Pulse equal regular, fair volume, and tension Heart, soft systolic at apex transmitted a short distance into axilla Lungs negative Reflexes normal No cedema of extremities. Sweetish odor to breath Abdomen, slight dulness in right side over an area the size of palm of hand palpation reveals a rather soft, slightly irregular apparently adherent mass which is slightly tender on pressure, about one half inch above Poupart's ligament and one inch internal to anterior superior spine of right ileum. There is a sinus surrounded by an area the size of silver dollar of scar tissue. Probe introduced runs backward slightly upward and outward, for a distance of about three inches. Pressure on mass in right side of abdomen causes flow of pus from sinus.

February 10 After transfer from Medical Service patient vomited several times after taking small amounts of water by mouth then fed by nutrient enemata, and at the end of twenty-four hours, as no vomiting had occurred and patient failed to retain two enemata nourishment in the form of beef tea and Mellin's Food was given by mouth Sweetish odor noticed on breath has continued to be present Patient complains of feeling very drowsy, dry, and very weak, considerable photophobia and dimness of vision Patient states that she has been mensituating for the past sixteen days Considerable difficulty in obtaining specimen of urine. To day about two ounces obtained, of which a satisfactory examination could not be made. Last night patient rejected several nutrient enemata. No vomiting has occurred except as above noted. Five loose bowel movements yesterday

February 12 General condition about the same Drowsiness, photophobia, and dimness of vision still continue Tongue extremely red and dry No urine passed yesterday Catheterized and twelve ounces of urine obtained which was amount secreted in past twenty hours. Patient again catheterized to day, at end of twenty-four hours and fourteen ounces of urine obtained. Examination of urine yesterday showed presence of acetone and diacetic acid.

February 12, 1904. Urine, twenty-four hours' amount, about 500 cubic centimetres. Color high; slightly turbid; 1020; acid; urea, 2.65 per cent. Indican present. Chlorides normal. No albumen. No sugar. No bile pigments. Acetone and diacetic acid present. Daily amount passed, eight to fourteen ounces Starch enemata given yesterday and to-day for diarrhœa. On giving enema it was noticed that there was slight bubbling of gas and slight discharge of fluid from sinus above Poupart's ligament. Patient given yesterday thirty grains soda bicarbonate every two hours. Patient has retained all liquid nourishment by mouth until this morning, when she vomited about one ounce of semidigested greenish, foul-smelling fluid. Eyes examined to-day by Dr. Allen Greenwood, who reports, "Examination of fundi shows nothing abnormal. Vessels appear normal as to size and color. Nerve heads normal. The partial loss of sight might be due to some disturbance in the postoccipital lobes such as occurs in the blindness of pregnancy without fundus changes. Possibly some toxic influence affecting the region of the brain mentioned."

February 15. Since last note patient has been semidelirious. Incontinence of fæces present past three days. Takes small amounts of liquid nourishment and complains of constant thirst. Fæcal discharge from sinus in right inguinal region. Sweetish odor still present in breath. Patient's general condition has slowly failed and, in spite of active stimulants, she died at 8.03 this morning. No autopsy.

CASE XLI.—Gastric Dilatation (Gastro-enterostomy, Posterior).—R. M.; aged nineteen years; drug-clerk. Admitted May 18, 1904. Service of Dr. Abner Post.

Present Illness.—Indigestion past three years. Vomiting after meals past two months, one to two hours after eating. Transferred from medical service, where urine was not examined for acetone or diacetic acid. More or less vomiting during the past three months.

May 19. Urine, high; 1030; no albumen; no sugar. Acetone present; no diacetic acid; has vomited no blood.

Operation.—May 31, 1904. Ether. Dr. Paul Thorndike. Stomach and intestines found normal. Anterior gastro-enterostomy done. Good ether recovery.

June 1 and 2. Urine, high; 1032; no albumen; no sugar.

Acetone present, no diacetic acid Vomiting continued after operation Constant epigastric pain

June 15 Condition same, drowsy, dull

June 21 Failing steadily, vointing continually Odor of action to breath Slightly dehrious Gradually failed, coma lasted four days, died June 24 No autopsy Temperature sub normal two and a half weeks before death Pulse rate rose from 60 at time of operation steadily to 110 at time of death CASE XLII — Actue Alcoholism — R H, aged thirty two

CASE XLII — Acute Alcoholism — R H, aged thirty two years, female, married, housework Admitted March 16, 1904
Service of Dr G G Sears Family History Negative Pre-

vious History Negative

Present Illness—Debauch two weeks ago, has been vomiting night and day since. Has eaten no solid food since, but has continued drinking. Three days ago vomited blood. Dull, constant pain in epigastrium. Low eructation. Headache for past two days. Has had flashes of light before eyes. Passes urine once in twenty four hours.

Physical Examination—Well developed and nourished Slan dry Obese Marked odor of acetone to breath Tongue red and dry Throat dry Heart and lungs normal Liverdulness normal Slight epigastric tenderness Vomiting lasted three days following entrance

March 16 Urine, normal color, 1025, neutral, slight trace of albumen, no sugar Acetone and diacetic acid present Amount passed in twenty four hours averaged during ten days from ten to twenty-two ounces

March 20 Takes food readily now Acetone odor has dis appeared Examination of urine negative Good convalescence Case XLIII—Burns, Typhoid Feter—B P, aged six

teen years, female, no occupation Admitted December 21
1903 Service of Dr F S Watson

Previous History — Epileptic attacks since age of two No attacks from ten to fifteen years of age Since then irregularly until past three weeks, when they have occurred every other day

Present Illness —Two days before entrance, patient during an epileptic attack fell on an oil-stove, sustaining burns of both arms and chin

Physical Evamination - Excessive sloughs of both forearms

Considerable swelling, redness, and tenderness of inside of both arms. Glands in axillæ.

December 22. Urine negative.

December 29. Wounds granulating.

January II, 1904. Wounds granulating fairly well. Heart's action rapid. Temperature elevated. Patient complains at times of abdominal pain relieved by enemata. General condition fair.

January 18. Burns doing well. For several days has complained of abdominal pain and vomiting. Has not taken food well. The possibility of intestinal ulcer is considered and patient is put on rectal feeding. Considerable tenderness in epigastrium. Very pale. Pulse weak and rapid, and patient apparently failing.

January 25. Patient is failing. After being kept on rectal feeding for one week, has been given small amounts of liquid by mouth, but vomits everything. Burnt areas healing slowly. Patient seen in consultation by Dr. H. S. Burrell, at whose suggestion urine was examined for acetone, which was present in large amount. Odor to breath. Patient very stupid, dull, and drowsy. Given solution of bicarbonate of soda subpectorally, later also added to nutrients. Patient continued to vomit and died. Widal negative. Leucocytes, 10,200.

Autopsy January 26, 1904. Body, Dr. Mallory; head, Dr. Southard. Autopsy, twenty-one hours' post-mortem. Aged sixteen years. Body length, 160 centimetres.

Fairly well developed, very poorly nourished white female. Slight lividity of dependent portions and slight rigor mortis. Œdema noted in tissue of chest on section, not noticeable in extremities due to salt infusion. Pupils equal. Rather extensive granulating superficial wounds of each forearm.

Peritoneal Cavity.—Contains 400 cubic centimetres of straw-colored fluid slightly clouded with small flakes of fibrin. Intestine grayish, smooth, and shining; show many dark-red, firm areas in lower portions of ileum, most marked at ileocæcal valve. Mesenteric lymph-nodes are large (two centimetres diameter and less), of dark-red color and firm. On section, cut surface is of uniform grayish pink with pin-head, whitish areas scattered over it.

Pleural Cavity.—Not remarkable. Pericardial Cavity.—Contains thirty cubic centimetres of clear straw-colored fluid. Heart Weight, 190 grammes. Subepicardial fat in small amount. Myo-

cardium dark red and firm, shows in fresh section (Scharlach R. stain), no fat Endocardium and valves normal Coronary arteries not remarkable

Measurements —Tricuspid valve, 11 centimetres, pulmonary valve, 6 centimetres, mitral valve, 8 centimetres, aortic valve, 5 centimetres, left ventricle, 15 centimetres, right ventricle, 05 centimetre

Lungs—Of delicate pink color anteriorly, dark blue at back, crepitate throughout On section not remarkable

Spleen Weight, 245 grammes Capsule tense Substance dark red and firm Trabecuke and Malpiginan bodies visible Gastro intestinal Tract—Peyer's patches in lower 150 centi-

metres of ideum appear as dark red, firm, slightly elevated areas with long axis in direction of intestinal lumen. Some of these just above ideocecal valve show small yellowish sloughs still attached to surface. Other patches show small ragged superficial ulcerations. Pancrear appears normal. Liver Weight, 1640 grammes. On section, cut surface is of brownish red color, paler than usual, and rather friable. No focal lesions seen. Central veins empty. Fresh section (Scharlach R. stain) shows very slight amount of fat in peripheries of lobules.

Kidney Weight, 295 grammes Capsule strips readily, leaving smooth surface Cortex of light grayish color, fairly firm, is distinctly marked off from dark red pyramids, and shows glomeruli as fine, glistening, pinpoint elevations Fresh section (Scharlach R stam) shows no fat

Adrenals appear normal Bladder, genital organs, and aorta

Head—Hair thick, dark Scalp normal Cranium thin, without diploe Dura adherent to calarium under bregma Sinuses contain fluid blood Villi slightly developed Pia bags out loosely, containing considerable clear fluid, which can be moved about readily between gri A few fibrous streaks and thickenings in pia alongside veins, notably in Sylvian fossæ Gyri not cedematous, strike one at first as narrowed, but prove normal on section. Puncta crumenta distinct in medullary portion of substance. Ventricles contain a slight surplus of clear fluid Ependyma of floor of lateral ventricles has a rather coarse, salt sprinkled appearance. Interbrain, isthmus, and cerebellum normal.

Middle Ears -Normal

Anatomical Diagnoses.—Chronic external pachymeningitis; chronic fibrous leptomeningitis; œdema of pia; moderate chronic internal hydrocephalus; chronic ependymitis; lesions of typhoid fever; acute splenitis; hyperplasia of mesenteric lymph-nodes; hyperplasia of Peyer's patches with necrosis; ascites; fatty liver.

CASE XLIV.—Fracture of Shaft of Femur.—H. S.; aged six years; school-boy. Admitted October 26, 1903. Service of Dr. W. P. Bolles. Family History. Negative. Previous History. Negative.

Present Illness.—Patient fell from back of team, catching leg in wheel, receiving lacerated wound just below knee and transverse fracture of middle shaft of femur.

October 23, 1903. Operation. Ether. Dr. Kelly. Repair, suture of wound. Plaster-of-Paris spica.

December 10. Ether given again on account of malposition of fragments, union broken up and apparatus (extension) applied.

February 25. Convalescence. All apparatus off. Patient up.

February 29, 1904. Three days ago patient vomited several times, and had slight puffiness of face. Urine became smoky and showed microscopical blood.

February 28. Urine, smoky; 1030; acid; albumen, one-eighth of 1 per cent.; no sugar. Acetone and diacetic acid present. Normal and abnormal blood. No casts or renal cells seen. Next day patient somewhat improved. Not so well to-day and has vomited considerably. Some headache. Acetone odor to breath. Two days ago acetone and diacetic acid present in urine. Some puffiness of face.

March I. Acetone and diacetic acid present in urine; no blood; no albumen.

March 3. Acetone and diacetic acid absent from urine. No vomiting past three days. Patient much brighter. No puffiness of face. Soda bicarbonate, xxx grains, every three hours, for past six days. Normal convalescence.

March 19. Discharged relieved.

CASE XLV.—Hæmorrhoids.—D. B.; aged thirty-four years, female; married; housework. Admitted July 8, 1904. Service of Dr. G. H. Monks.

Present Illness.—Discomfort in region of anus for past twelve years. Piles protruded past year on defecation, with pain.

Local Examination.—Several hæmorrhoidal masses about rectum. No ulceration.

July 9 Urine, normal, 1024 acid, no albumen, no sugar, no acetone, no diacetic acid

July 11, 1904 Operation Ether Dr Kelly Hæmorrhoidal masses excised and edges sutured with chromicized catgut No 2

July 12 Urine passed, normal, 1017, acid, no albumen, no sugar, acetone present, no diacetic acid No clinical symptoms excepting slight odor of acetone to breath No further examination mide of urine Normal convalescence

CASE XLVI — Appendicitis Acute, unth Abscess — J H, aged six years, school girl Admitted July 10, 1904 Service of Dr G H Monks Family History Negative Previous History Negative

Present Illness —Four days ago pain in abdomen localized in right side over area the size of palm of hand, just beneath liver extending into lumbar region. Vomiting, odor of acctone to breath. Leucocytes, 14,400. Slight dulness over above area, tenderness and marked muscular spasm.

July 10 1904 Operation Ether Dr G H Monks Appendux, abscess found just beneath liver Appendux running up and behind occum and retroperitoneally Appendux gangrenous and perforated, removed Good ether recovery Urine passed the day of operation, normal, 1025, no albumen, no sugar, acid Acetone and diacetic acid present

July 13 Urine, negative Patient doing well No vomiting following operation Patient slightly dull, otherwise no symptoms Normal convalescence

CONCLUSION

In presenting this series of cases, it is not my intention to attempt to formulate some definite theory for the causation of the condition present. I simply wish to present a series of cases which I feel sure are identical with those reported by other observers.

At present our knowledge of the conditions accountable for the symptoms present, and for the occurrence of acetone and diacetic in the urine, is yet in its infancy. It has been proved experimentally that it is not due to acetone circulating in the blood, as the same condition has been produced experimentally by other substances. The amount of acetone found in the urine is no index as to the severity of the affection. Whether the occurrence of the symptoms is due to a toxic substance acting on psychomotor centres, or due to pressure on these centres, has not been proven. This is only offered as a suggestion as to the causation. That there is some toxemia occurring is doubtless true; whether it is due to the presence of volatile fatty acids, to the rapid destruction of proteid matter, or to the rapid elimination of the alkalies is impossible to say at the present time.

The object of this paper is to report a series of cases in which the condition has been present in a large proportion; to call attention to the condition as it exists in surgical cases; to show that what has been considered as a rather fatal condition is present mildly in a variety of cases, and to hope that it will stimulate to some extent experimental and clinical investigation.

BIBLIOGRAPHY.

Becker. Deut. med. Woch., 1894, 16, 18; Virchow's Archives, Vol. exl, p. I.

Bernert. Zeitschr. f. Heilk., Band iii, Heft. 2.

Brewer. Annals of Surgery, October, 1902.

Edsall. American Journal of the Medical Sciences, April, 1903.

Guthrie. Lancet, July 4, 1903.

Herter. Chemical Pathology, 1902.

Von Jacksch. Ueber Acetonurie and Diaceturie, Berlin, 1905.

Joslin. Journal of Medical Research, 1904.

Kaulisch. Prager Vierteljahrsschr., 1857, Band xxiv.

Kraus. Alleg. Path. Lubarsch. und Ostertag, Heft 2, 1895.

Kussmaul. Zeitschr. f. klin. Med., Band i.

Lambert. Journal of American Medical Association, October 8, 1904.

Lane. Lancet, January 27 and February 27, 1894.

Landois. Uræmia, 1891.

Magnus and Levy. Arch. f. exper. Path. and Phar., Band xlii.

Müller, J. Arch. f. exper. Path. and Phar., Band. xl.

Muser. Medical Diagnosis, 1904.

von Noorden. Autointoxication, 1903.

Petters. See Kraus.

Rosenfeld. Zeitschr. f. klin. Med., 1895, Band xxviii.

Schwarz. Deutsche Archiv. f. klin. Med., Band lxxvi.

Taylor. American Journal of the Medical Sciences, No. 117.

Tyson. Journal of American Medical Association, October 8, 1904. Wiesenberg. Proceedings of Pathological Society, Philadelphia, 1904.

Willson. Journal of American Medical Association, October 8, 1904.

GALL-BLADDER AND BILIARY-DUCT SURGERY.

OF CHICAGO

AMERICAN surgeons have shed a lustre on the develop ment, evolution, and perfection of our art in many fields of surgery, but in no department of surgery has the American mind left its impress in a more forceful manner than in the development and progress of the surgery of the gall-bladder and bile ducts

Cholecystotomy was first performed by Bobbs, of Indianapolis, in 1867, and while it is probably true that the empyæmic gall bladder that he incised and drained was adherent to the abdominal wall and the operation may not have been much more serious than opening an abscess, yet it was a step in advance, and was the work of a pioneer, and blazed the way for its establishment as a definite surgical procedure by Marion Sims in 1878, and for the performance of cholecystectomy by Langenback in 1880 Thus it will be seen that the evolution of gallbladder and bile-duct surgery has occurred within the memory and during the professional activities of the Fellows of this So ciety, many of whom have contributed their quota to the general advance of our surgical knowledge of this topic. I might mention the investigations of our former distinguished Fellow, the lamented Fenger, in 1895-6 on stone in the choledochus, where it is impacted and immovable, the icterus is marked and persistent, where the stone is movable or of the ball-valve variety, the icterus is variable, a difference in the intensity of the jaundice is observed from day to day, after an attack of pain, from temporary impaction of a movable stone in the duodenal end of the choledochus, the jaundice is markedly increased in the skin and sclerotic. The urine contains more bile and the fæces are more clay colored, when the grasp of the

Read before the Chicago Surgical Society, November 7, 1904.

duct walls upon the stone is relaxed and the stone is released, so that it no longer completely occludes the duct; it occupies a more dilated part of the duct, and the bile escapes by its side, causing an amelioration of all symptoms and a lessening of the icterus until it again becomes impacted. This alternating current or changing cycle of symptoms will go on indefinitely until terminated by operation or the death of the patient from cholæmia or exhaustion.

Bevan has taught us the exact anatomical relations of the portal vein to the gall-ducts, and suggested an improved sigmoid incision.

Ferguson has shown us how to avoid biliary fistulæ by suturing the gall-bladder to the peritoneum at the upper angle of the wound instead of attaching it to the skin in a dependent position.

Murphy has added to our knowledge of the functions of the gall-bladder, and by the application of his ingenious button has rendered the operation of cholecystduodenostomy rapid, safe, and satisfactory in cases of stenosis of the choledochus.

Ochsner has made the diagnosis of gall-stones much simpler by maintaining that in nearly all cases of gastritis the symptoms in reality are due to gall-stones. He has also greatly reduced the mortality of choledochotomy by stitching the cigarette drain to the open lips of the duct.

McArthur has perfected the technique of operative procedures and shown the limitations of X-ray diagnosis, while Eisendrath has enriched our knowledge of the pathology of infective cholangeitis.

Nearly every other member of the society has in like manner contributed to the sum total of our knowledge of this subject, and I want to congratulate the members of this society for their intellectual activity along the lines of true scientific advancement. They are worthy co-workers with Mayo, Richardson, Deaver, Kehr, Robson, Kocher, and other masters in this domain of surgery.

The advance of knowledge has been steady, rapid, and permanent, and our interest cannot wane when we remember that

gall-stones are present, according to Mosher and the Johns Hopkins tables, in about 7 per cent of all people, and prove fatal in about 10 per cent of this number

Over 12 per cent of all gall-stone cases show symptoms of common duct obstruction

Stones may be found in the gall bladder, cystic duct, and choledochus in the same patient, and not infrequently failure to cure the patient by operation has been due to the surgeon overlooking a stone in the choledochus after removing a large number from the gall bladder. This occurred to me in two of my earlier operations, necessitating its removal at a later period.

In one case Miss R, aged thirty six years, operated on by me at the Woman's Hospital, January 22, 1903, for gall stones causing recurrent attacks of bihary colic with mild jaundice I removed a large number of stones from the gall bladder and cystic duct nine from the common duct by a choledochotomy, and for several days afterwards stones of small size were washed out through the wound, one was vomited up, and several were found in the stools evidently coming down from the hepatic and liver ducts. This patent made a perfect recovery, and has had no recurrence of the symptoms.

Cause —Gall-stones are formed in the gall bladder and ble ducts by the agglutination of material precipitated from bile, and are composed of cholesterin, bilirubin calcium, and mixed forms according to Brockbank, in other words, of bile salts and pigments. Anything that tends to slow the bile cur rent causes the precipitation of these salts and biliary sand and the development of cholelthiasis. We no longer depend upon old age, tight lacing, lack of exercise, ingestion of large amounts of carbohydrates, and the pressure of tumors as the sole cause of the slowing of the bile current, but recognize as equally potent factors in the production of this disease infective micro organisms that gain entrance to the bile ducts from the intestinal lumen or blood current and induce a catarrh of the ducts, an erosion of the epithelium of the gall bladder and bile ducts, an increased production of cholesterin, precipitation of

the bile salts, causing or increasing the cholelithiasis, causing ulceration and phlegmon of the walls of the gall-bladder and bile ducts in a manner precisely analogous to what we see in an acute infective appendicitis. The morbific micro-organisms chiefly responsible for these destructive changes are the colon bacillus, the bacillus typhoses, staphylococcus and streptococcus; obstruction in the common or cystic duct preventing the escape of these infective micro-organisms causes the most rapidly destructive pathological changes in the mucosa and wall of the duct or gall-bladder; long-continued irritation from an imprisoned stone or stone induces malignant disease of the gallbladder or common duct, hence the frequency of carcinoma in this region; long-continued icterus in an elderly patient should awaken a suspicion of carcinoma of the gall-bladder or ducts, as a sequence of unrelieved cholelithiasis. Irritation of the outlet or neck or mouth of a viscus surrounded by circular muscular fibre subject to alternate contraction and dilatation due to the passage of the contents of a viscus, or irritation of the orifice of a duct is very prone to induce carcinoma, as in the pylorus, the cervix uteri, the rectum, or the gall-bladder.

The gall-stones may be single or multiple, facetted or smooth, sometimes of mulberry appearance, and vary in size from a grain of sand to a hen's egg, and green, brown, yellow, or black according to the arrangement of the bile pigment entering into their formation, faceted stones being found in the gall-bladder and smooth ovoidal ones in the choledochus, as a rule.

Symptoms.—The formation of a stone requires several months and is preceded by gastro-intestinal catarrh, constipation, flatulence, impaired appetite, discomfort in the epigastrium and right hypochondrium, sallowness, slight icterus, scantiness of urine with increase of bile and urea in the urine, sour stomach, tenderness over the gall-bladder, and when there is bacterial invasion of the viscus moderate temperature and an occasional chill with bilious colic and headache.

Typical gall-stone colic soon becomes established, and if the obstruction is in the common duct there is the sudden onset of agonizing pain, paroxysmal in character, lasting from a few hours to a couple of days, originating in the region of the gall-bladder and radiating to the back and under the right shoulder-blade, often accompanied by nausea and vomiting, especially at the beginning of the attack. It may terminate suddenly or gradually. If the attack lasts more than twenty-four hours there is usually jaundice. If the stone passes through the common duct there is immediate relief and the stone will be found in the stool, if it is arrested in the common duct in the diverticulum of Vater we have the chronic form, with frequent repetitions of the clinical picture I have painted, until the patient is relieved by operation, or dies from cholamia or exhaustion.

Many of these cases are treated for years by medication, diet, massage, baths, exercise, olive oil, a course at Carlsbad or West Baden without permanent benefit, and the delay usually causes serious complications of circumscribed peritonitis, dilata tion, and infection of the gall bladder and ducts, phlegmon, perforation, circumscribed abscess, empyamia of the gall bladder, universal adhesions to adjacent viscera, and the obliteration of normal anatomical landmarks that immensely increase the difficulties of the operation and add to its mortality. The results of delay and repeated attacks cause complications that are strikingly analogous to those of appendicitis.

I desire to appeal strongly for early diagnosis, shorter period of medical treatment, early surgical intervention, and a lessened mortality for a disease that should be recognized as a surgical affection and only amenable to surgical treatment. The former dictum of three months' medical and dietetic treatment is altogether too long, and leads to unnecessary suffering, serious complications and a higher mortality.

Uncomplicated cholecystitis and cholehathisis give practically no mortality under prompt and proper surgical treatment by incision, evacuation, and dramage. Cholecystotomy, chole cystectomy, and choledochotomy should always be followed by tubular and capillary drainage for some days after the operation, a cigarette drain should be attached to the lips of the wound in the choledochus in all common duct stone opera

tions. I believe it is safer to drain all cases, as imprisoned bile always contains infection germs, and you lessen the cholangeitis and cholæmia more rapidly in this way.

Waring gives the following indication for operation:

- I. "The presence of a tumor in the abdomen which appears to be an abnormally distended and large gall-bladder.
- 2. "The existence of jaundice, which is persistent together with other signs and symptoms which point to complete obstruction of the common bile-duct or the common hepatic duct.
- 3. "The occurrence of successive paroxysmal attacks of biliary colic, with short intervals between the individual attacks, which are lowering the general health of the patient, inducing a state of general exhaustion, and are not amenable to medical measures.
- 4. "Symptoms of localized inflammation in the region of the gall-bladder which are associated with the occurrence of attacks of biliary colic.
- 5. "The occurrence of acute peritonitis which is probably due to perforation of the gall-bladder or one of the biliary ducts and escape of calculi and purulent matter into the peritoneal cavity."

The soundness of the views expressed in this paper are exemplified by the following illustrative cases where early operation was declined or not possible for some reason:

Case I.—A patient came to my office to-day presenting the classical clinical symptoms of stone in the common duct, with a history that is familiar to all of you. Mrs. M. K., aged fifty-two years, married, Irish, has suffered from indigestion and flatulency, more or less, all her life. About six years ago she said she was bilious, and was treated by Drs. Davis and Johnson for six weeks in Mercy Hospital. Prior to this she had frequent attacks of bilious colic. She has had chills and has vomited every few days during the past year at intervals. Jaundice has been quite marked, the color varying with the severity of the attack. She complains of marked itching of the skin. There is yellowness of the conjunctiva, and tenderness over the region of the gall-

bladder I told her she had gall-stones, and should have an operation Like many patients who come to us with surgical affections that require prompt surgical intervention, she said she did not want to be operated on, but wanted something to stop the itching of the skin and take away the yellow color, in other words, to relieve the obstruction in the common duct that produced the symptoms Operation was refused. She wanted to talk with her father. Her father is eighty-two. They live together, and she has no money

I simply cite this typical case which illustrates the difficulties of carrying out the treatment I advocate in this paper, namely, early operation soon after the diagnosis has been made, say within a few weeks after we are certain of the pathological conditions present

CASE II -Another case that illustrates in a striking manner the changes that take place is that of Dr G M B, aged fifty-six years, of Benton Harbor, Michigan, who consulted me early in August, stating that for a number of years he had suffered from stomach trouble, he had acute indigestion, he had to be careful what he ate He had a great deal of flatulency and tenderness at the pit of the stomach From my knowledge gained from Dr Ochsner's experience with these gastric symptoms, I said to him, "Doctor, you have gail-stones" "Oh, no, I have not gall stones, I have stomach trouble, and my liver is enlarged" For two or three years he has suffered from attacks of biliary colic, and his general health has been much impaired. He attributed this always to acute gastritis and liver complications These symptoms were progressively increasing. He had two or three severe attacks, with marked loss of flesh He lost something like twenty pounds He came to my office accompanied by his wife on the 25th of August, just after an unusually severe attack. At this time he had a rapid pulse, temperature of 102° F, marked tenderness over the gall bladder Indeed, the region of the gall-bladder was so tender that he could scarcely be touched, and he presented the appearance of a haggard, old, sick man. He had aged rapidly during the last few weeks He had become stooped I told him that he must have an immediate operation, that he had gall-stones, that infection of the gall-bladder had taken place, and

that an immediate operation was the safest and best thing for him. Almost in the face of his violent protest, I called a cab and sent him to the West Side Hospital, and the next day operated. In making a long incision through the outer border of the right rectus, I came upon a large mass of adhesions. The omentum was adherent to the gall-bladder, liver, and colon. There was a mass of adhesions covered and walled in by the omentum, and after packing off the abdominal cavity with strips of gauze, I carried my finger under the lower border of the omentum, separated the adhesions a short distance, when I opened into a large abscess, from which six or seven ounces of thick pus escaped. This was mopped out from time to time with gauze sponges, and the abscess cavity was thoroughly dried out. I then carried my finger into the abscess cavity and found a perforation of the gall-bladder, an opening into which the finger could be readily introduced, and with the finger introduced I found and removed five mulberry calculi. I do not see many of them, but these presented the typical appearance of a mulberry in every respect. After these were removed, a large glass drainage tube was introduced, and iodoform gauze packed around the tube with strips brought out through the wound. The wound was closed in the ordinary way and the patient put to bed. He made an uninter-rupted and rapid recovery. The tube was left in three or four days, and at the end of two weeks the wound was practically closed, patient leaving the hospital about two days later, and had no untoward symptoms. He has steadily improved. He is now attending to his practice in Michigan.

This case illustrates the pathological changes that take place from delay and error in diagnosis.

Case III.—G. F. S., aged sixty-two years, was seen by me March 15, 1903. He had suffered from a typical attack of biliary colic in 1900, when a large quantity of biliary sand was passed, with complete relief of the symptoms. At that time he had elevation of temperature and pain, and under catharsis and flushing of the intestine, as well as washing out the stomach, etc., he was completely relieved. The large quantities of biliary sand were the cause of the trouble. During the present attack, in March,

1903, he complained of pain and tenderness in the region of the gall bladder, he had a pulse of 96, temperature, 102° F, tongue coated, breath foul, bowels constipated, no icterus, and the usual marked tenderness over gall bladder A diagnosis of acute infective cholecystitis was made, and an operation for draining the gall bladder was advised. This was postponed by the patient from day to day, although urged at each daily visit, until the night of the 21st of March, 1903 at midnight, I was summoned in great haste, and found he had a chill I telephoned to Dr Wyllys Andrews, expecting on examination to find perforation of the gall bladder, with the necessity for an emergency operation Everything was prepared a day or two before that, so that we were ready, and made an immediate operation at the house I made an incision through the right rectus, and immediately upon opening the abdomen found a condition similar to that in the case of Dr B, in which I described a mass of adhesions, the omentum being adherent to the liver surrounding the gall bladder. and little by little there was an escape of a quantity of muddy, offensive pus, bile tinged, and flaky This was mopped out A phlegmon of the gall bladder wall was found, and on lifting up the adhesions we found numerous gangrenous spots surrounding a large perforation I incised the gall bladder freely. No gall stones were found in this case, but simply infected, inspissated, offensive bile The patient went along and made good progress towards recovery until the eighth day, when on turning over in bed he suddenly cried out with pain in the right lung, and com plained of dyspinea He became cyanosed Dr Andrews and Dr Edwards were present with me at the time, and the sudden onset of these serious symptoms evidently was due to a clot, a pulmonary embolism In ten minutes the patient was dead. doubtless from a clot occluding the pulmonary vessel Had this patient consented to an operation on the 10th, the 16th, or the 18th of March, his life might have been saved. That is to sav. early dramage of the infected gall bladder would have lessened the probabilities of such an unfortunate complication and termina tion as took place

Drainage opening was lined with granulations and healing rapidly. No post mortem could be obtained

CASE IV—Mrs L, aged seventy one years, had attacks of biliary colic at intervals for several years Tenderness and disten tion of the gall-bladder noticed in March, 1904; marked icterus, with vomiting and constipation. There was gradual emaciation. A diagnosis of obstruction of the common duct and infective cholangeitis was made. October 4, 1904, I succeeded in obtaining consent for an exploratory operation, and with the assistance of Dr. Frankenthal, at the Woman's Hospital, I made an incision and came down upon an immensely dilated gall-bladder. The gall-bladder contents consisted of sixteen ounces of turbid, tarry bile, with a great many flakes, and some small gall-stones. was one of the largest gall-bladders I have ever drained. was in a very bad condition. No stone was discovered in the common duct, but the neck of the gall-bladder was surrounded by a number of small tumors. There were three or four irregular tumors which compressed the common duct. It was a case of carcinoma of the gall-bladder, and on account of the condition of the patient nothing was done except to drain the gall-bladder. She died two days afterwards, vomiting a sanguinolent material, with regurgitation from the stomach. During the performance of the operation there was noticed a laceration of the liver to which the immense gall-bladder was attached, and this small rent was made in the liver by a wide pair of forceps; it was stitched with catgut, and no hæmorrhage occurred after this. Whether the oozing was due to the cholæmic condition, I do not know. It is probable that it was. We know that in these cases we have a persistent oozing from the mucosa or from any wound in the gall-bladder. The blood does not coagulate, and the oozing continues until the case terminates fatally, with more or less vomiting and exhaustion. For nearly a year this patient was urged to undergo operation, but declined.

CASE V.—Mrs. R., aged sixty-seven years, was referred to me by Dr. Byford, with a diagnosis of stone in the common duct. I concurred in the diagnosis. She gave a history of having suffered from frequently occurring attacks of biliary colic, with catarrh of the stomach, and that she had these attacks of catarrh of the stomach recur at intervals during the last fifteen years. In June, for the first time, she had a typical attack of biliary colic, and was somewhat jaundiced at the time, and since June, up to the time of operation, she had about once or twice a week severe attacks. Ten days before she came to the city she had an unusually severe attack, which was accompanied by

a chill elevation of temperature marked jaundice and her physician who was a son in law brought her to the city for operation There was marked tenderness over the gall bladder Operation was performed October 21 at the Woman's Hospital with the assistance of Dr Byford The gall bladder was found to be assistance of Dr Bytord regarding turbid bile and fifteen small stones. These were round and not faceted There was one large round stone found in the common duct of the ball valve variety and stone found in the common duct of the ball valve variety and which was doubtless responsible for the recurrent attacks. As I opened the gall bladder and cystic duct the stone did not seem so large as I could push it upward through the cystic duct and extract it through the gall bladder. I thought as it lay in a dilated pouch in the common duct. I could readily extract it avoiding an incision in the common duct but in pushing it up it got away. meason in the common duct but in pushing it up it got away from me and passed from the common duct into the hepatic duct and I was unable to bring it down I was in a quandary After a few moments deliberation I made an opening in the common duct at the pouch occupied by the stone before and expected to pass up a small forceps and extract it but I was unable to do so The stone eluded the grasp of the forceps so I stitched in a large The stone educed the grass) on the forceps so I stateled in a large rubber drannage tube passing it up through the opening in the comon duct. I put a glass drainage tube in the gall bladder. I packed some gauge around the tube in the common duct and closed the wound. The patient gained right along and she is now fully convalescent. The stone being found on the dressings on the sixth day when the common duct drain was removed

Case VI -- I wish to mention another case to show how we have improved in our knowledge of gall bladder surgery in the attachment of the gall bladder when cholecystotomy is done. Mr S aged sixty one years was admitted to Wesley Hospital in 1800 with gall stones and had been operated on about a year previous to this by another surgeon for gall stones. He was admitted to my service and I found he had a large bihary fistula admitted to my service and I tound he had a large bilary fistula following the operation at which the gall stones were extracted. The gall bladder had been stitched at the dependent portion of the wound to the skin instead of to the peritoneum leaving a large bilary fistula with patulous mouth. In this case I reopened by the side of the gall bladder resecting about one third of it and using circular purse string catgut sutures around the upper part of the wound attaching the gall bladder to the upper angle of the wound to the peritoneum, and secured permanent closure in a couple of weeks.

CASE VII.—The patient is fifty-five years of age, married, adjuster by occupation, and was seen in consultation on the 8th of October, 1904, suffering from infective cholecystitis, empyema of the gall-bladder, ulceration, with symptoms also of appendicitis. He was in such a bad physical condition that the operation was delayed. He had an acute general peritonitis. The day I saw him his abdomen was immensely distended and tympanitic. He was vomiting. The whole right side of the abdomen was dull and tender on pressure. He was put upon starvation treatment; nothing given him by mouth, the stomach was washed out, and he was given three ounces of normal salt solution and an ounce per rectum every three hours. This treatment was continued for about ten days; vomiting and tympanites disappeared. His condition improved so much that we felt justified in operating. On account of agglutination on the right side of the abdomen of the intestines, gall-bladder, and appendix, I thought, instead of opening the general abdominal cavity, I would go down through this mass and do an extraperitoneal operation, and, expecting to find an abscess and all kinds of complications, I immediately came in contact with what seemed to me like a fæcal collection of two or three pints, walled off from the general cavity, lying between the small intestine and gall-bladder, and I could not tell anything about the anatomical outlines of the case. They were not clear. The cavity was walled off to the inner side by coils of intestine, on the outer side by the abdominal wall. There was a large amount of offensive, purulent, yellowish fæces, also a large amount of pus and some bile. This was washed out. I then introduced my finger and found an enlarged, irregularshaped abscess cavity, with free communications with the intestine and with the gall-bladder. The cavity was washed out. took a long forceps, made a lumbar stab, establishing throughand-through drainage, putting in a large rubber tube, and irrigating two or three times a day. Five or six days after this the man's condition improved very materially, and six days, I think, after the operation was performed, a gall-stone appeared. Since then, nearly every day he has been flushing out gall-stones. Bile now flows freely. The fæcal discharge has entirely disappeared, and we now have a biliary fistula. The man is still in a somewhat critical condition, although his recovery is certain. The daily irrigations are being kept up. Unquestionably he had empyema of the gall bladder, the adhesions ruptured, or there was a perforation of the gall bladder, also a perforation or ulceration communicating with this abscess cavity and the lumen of the bowel, so that there was a discharge of fæcal matter with bile and gall stones.

These cases are cited to illustrate the dangers of delay and the complications that arise from postponing a necessary surgical operation to a time when it is done as a last resort

VOLVULUS OF THE JEJUNUM.

BY CHARLES L. SCUDDER, M.D.,

OF BOSTON, MASS.,
Surgeon to the Massachusetts General Hospital.

Miss M. W., an adult, had had dyspepsia for several years; otherwise her health had been good. After eating a boiled dinner of cabbage, corned beef, and potatoes, she had severe "cramps" in the abdomen. These "cramps" resembled "colicky pains." Moving about in the bed and doubling herself over-that is, drawing her knees up to her abdomen—seemed to temporarily afford relief, but the colicky, crampy pains continued. These colicky, crampy pains were intermittent, easing up a little and then recurring with renewed force. She vomited, she had extreme nausea, she had many loose movements from the bowel. None of these movements contained blood. The vomiting and the "dry heaving" continued all night. I saw her upon the third day of the attack. She looked sick, she presented a peritoneal facies, her features were drawn, the angles of her mouth and alæ nasi were depressed, there was a little black vomitus on the lips and chin, the abdomen was distended, the umbilicus was flush to the level of the abdominal wall, the abdomen was tympanitic throughout. No tumor could be felt.

Operation discovered an almost black coil of the jejunum, about two feet long, twisted at its mesenteric attachment. (Fig. 1.) Upon untwisting this volvulus, its exact extent was determined. It was found, as is seen in the photograph, to extend up to within about two inches of the beginning of the jejunum and thence down for two feet. (Fig. 2.) The condition of the patient precluded the possibility of further interference. The abdomen was closed and the woman died.

This case serves to illustrate the very great importance of a careful, discriminating analysis of abdominal pain. Had this case been operated at the onset of the attack, the chances of recovery would have been good. The several hours' delay caused the death of the bowel, tremendous shock to the individual, and



Fig. 3 —Volvulus of primum seen untwisted but in same situation as found at operation



Fig. 2.—Thrombosis of the mesenteric vessels due to volvulus of the jejunum. Note upper boundary of gaugrene of gut close to jejunal origin. Omentum and transverse colon drawn upward, showing mesocolon and beginning of jejunum.

recluded the possibility of surgical relief

The pain in this case was typical of a mechanical obstruction

It was not possible to make a diagnosis of volvulus or of a band, but that there was a mechanical obstruction from some cause there was no doubt

This case is recorded because the volvulus of the jejunum was high, which is unusual I suppose that the shock from the high situation of the volvulus must have been great, and de cidedly greater than from a volvulus seated in a lower portion of the small intestine. In a case with such a high situation of the volvulus arises the question, What is the best surgical treat ment? Had the case been seen early and had the bowel been viable, a simple untwisting of the volvulus would have been all that was necessary, but with the bowel gangrenous so close to the jejunum, it was a question as to the wisest operative procedure. A resection of the gut, an anastomosis with a Murphy button, or a resection of the gut, and closure of the jejunum at the proximal end, and an anastomosis of the distal jejunal end into the duodenum might have been the best procedure.

After dividing the gut at the jejunal origin, it might be possible to divide the peritoneal reflection and to free the last part of the duodenum sufficiently to facilitate the use of the Murphy button. I shall do this experimentally upon the cada ver in order to determine if this is feasible.

The pathological report from the Pathological Laboratory at the Massachusetts General Hospital, so far as the case surgically is concerned, was as follows. Ohliterating thrombosis of the superior mesenteric vein, harmorthagic infarction of a portion of the jejunum. The first portion of the jejunum over a distance of about seventy centimetres is dark purple in color and its mesentery is thickened and purplish in color. At its upper and lower margins it is rather sharply marked off from the diodenum and from the remaining portion of the jejunum, the lower line of demarcation being less sharp than the upper (Fig. 2.)

OPERATIONS ON THE LOWER ENDS OF THE URETERS BY THE INGUINAL EXTRAPERITONEAL ROUTE UNDER LOCAL ANÆSTHESIA (COCAINE).

A REPORT OF THREE URETEROVESICAL IMPLANTATIONS AND THE REMOVAL OF
A URETERAL CALCULUS.

BY JOHN A. SAMPSON, M.D.,

OF BALTIMORE,

Late Resident Gynæcologist, The Johns Hopkins Hospital; Late Instructor in Gynæcology, Johns Hopkins University.

PATHOLOGICAL conditions of the lower end of the ureter usually impair its function, either by interfering with the passage of urine from the kidney to the bladder or else permitting a reflux of urine from the bladder into the kidney. instance there is a damming back of urine into the pelvis of the If the ureter is kidney with a consequent hydronephrosis. thickened and inflamed, its lumen may not become greatly enlarged, because the pressure is not sufficient to stretch its thickened walls, as may be frequently seen in a tuberculous ureter, and also if the ureter is embedded in dense tissue its expansion will be interfered with. On the other hand, a stricture (from any source) of the lower end of the ureter usually causes a hydroureter, which may become tortuous, and the natural dilatations of the ureter may become greatly enlarged as contrasted with the natural constrictions which may be little or not at all affected by the distention of the ureter. The distention and tortuosity of the ureter may cause it to break through the tissue about it, i.e., its imperfectly formed sheath,1 thus giving rise to hernial formations, the ring of the hernia being formed by the intact sheath at either end of the point of rupture. hernial rings of the ureteral sheath may cause the so-called valves sometimes found in these cases. The function of the kidney whose ureter is diseased is not only interfered with, but

the organ is in a condition of lowered local resistance, and sooner or later the kidney is apt to become infected either through organisms carried there by the circulating blood or from others which may gain access to the lumen of the ureter and reach the kidney through the damming back of urine caused by the ureteral stricture

We may speak of the condition brought about by a dis-eased ureter as that of renal insufficiency. This insufficiency may be relative, which is especially true if only one ureter is diseased and the other being intact is sufficient, or even if both are involved, the two kidneys together may be able to maintain renal function sufficient for the individual In this condition there is renal sufficiency, and the term relative renal insufficiency is used only in a comparative sense. In other cases where both ureters are involved and renal compensation or recuperation has not taken place, there exists a condition of renal in sufficiency which may be temporary or permanent The compensatory ability of the kidney is a very interesting condition, and we are all familiar with the hypertrophied kidney resulting from compensatory changes which have taken place in one kid-ney after the other has been removed or its function has been impaired Of still greater interest is the recuperative power of the kidney Temporary obstructive anuria may occur and yet the individual may live, and especially interesting are those cases in which both ureters have been accidentally ligated for from twenty-four to seventy-two hours, and where, after the ligatures have been released or the ureters have been reim planted into the bladder, the kidneys have resumed their func tion and the individual has recovered, as have been reported by Zweifel,² Purcell,³ Markoe and Wood,⁴ Neumann,⁵ Bailey,⁶ and I have seen one such case It is evident, then, that the kidney has great recuperative ability, and this knowledge should influence the surgeon in the operative treatment of such conditions I am conducting a series of experiments along these lines, and one dog lived and was well five months after the removal of its normal kidney, there being apparently perfect renal sufficiency from a kidney whose ureter had been

ligated for one week, and then the distended ureter was resected and reimplanted in the bladder; and after waiting one month for its kidney to recuperate, the hypertrophied sound kidney was removed. Experiments along these lines and also clinical experience teach us that the kidney has great recuperative ability, and that operations on the kidney should be more conservative.

We must consider two general classes of diseased conditions of the lower ends of the ureters:

I. Those cases with absolute renal insufficiency demanding an immediate operation, in which nephrotomy plays such a prominent rôle, in order to relieve a kidney with or without infection, whose ureter has become partially or completely occluded. (I have purposely omitted the postoperative anuria due to occlusion of the ureters by ligatures when the operation of choice should be the release of the ureter.) In this first class of cases, the operative treatment is temporarily to relieve the condition, and nephrotomy seems to be the operation of choice in most of these cases. It may be done under nitrous oxide anæsthesia, as recommended by Bevan, and as has been done in this hospital; or, as the operation is of short duration, it may usually be done under ether or chloroform. Two of the three cases reported in this article had bilateral nephrotomies in order to relieve the renal insufficiency existing at the time.

II. The second class of cases are those of relative renal insufficiency, in which the cause of the trouble still exists, and a temporary relief by a nephrotomy may or may not have been done. In order to cure the patient, the cause of the trouble must be removed, the ureter resected and reimplanted in the bladder, or a stone removed which may be obstructing the lumen of the ureter, or some other operation done to relieve the local condition. These operations usually take a long time and require exacting, careful work, in a patient with an unstable renal sufficiency, and on this account sometimes ill suited to undergo a prolonged general anæsthesia.

If certain operations may be done well without causing the patient much discomfort or pain, a local or general anæsthetic may be dispensed with for these operations. This proposition may be carried still further, if in a long operation certain steps are painful and others are not, why should we not use a temporary anæsthetic, such as nitrous oxide, or a local anæsthetic, as cocaine, for those steps of the operation which cause pain, and onut an anæsthetic when it is not necessary? It becomes very evident that a knowledge of the sensibility of the field of operation to pain should influence the surgeon in choosing an anæsthetic, especially if a general anæsthetic is contraindicated

In all three cases, with four operations under local anæs thesia, about to be reported, the condition was that of relative renal insufficiency due to a diseased condition of the lower ends of the unters.

In the first case the condition was that of bilateral ureteral stricture with ureteral mefficiency, i.e., the diseased lower ends of both ureters had been converted into sinuses, which interfered with the passage of urine from the kidneys to the bladder and were also unable to prevent a reflux of urine from the bladder into the kidneys

In the second case, the lower ends of both ureters had been dissected free in a more radical operation for carcinoma cervicis uteri with a resulting unitateral ureteral necrosis, giving rise to a ureteral fistula. As the lower ends of both ureters had been freed, the function of both may have been interfered with, at least temporarily. The necrosis of one ureter gave rise to a ureteral fistula with consequent formation of a ureteral stricture, and thus impairment of the function of the kidney.

In the third case there was bilateral renal infection associated with a cystitis Double nephrotomy had temporarily reheved the condition A calculus which partially occluded the right ureter was diagnosed by means of the wax-coated catheter and X-rays

Case I —Mrs T M, aged thurty-two years Gyn Nos 9495, 9705, and 11,101½ (Referred to in a previous communication s)

Diagnosis -Double pronephrosis with double ureteritis, stricture and inefficiency of the vesical ends of both ureters per-

mitting a reflux of urine from the bladder into the pelvis of the kidneys.

Operation.—Resection and implantation of both ureters into the bladder, by the inguinal extraperitoneal route. September 8, 1903, and November 11, 1903.

Anæsthetic.—Cocaine (Schleich's Solution). Contraindications to a general anæsthetic. Renal insufficiency. Patient had been given a general anæsthetic on previous occasions, and after the last operation she not only left the table in bad condition, but the convalescence was very slow, being marked by prolonged nausea, vomiting, and a rapid pulse.

HISTORY OF CASE.—Family History.—Negative; no history of tuberculosis.

Personal History.—Negative; always well until present illness. Married seven years; two para (five and two and a half years), one miscarriage before the birth of her first child. Labors normal; no history of puerperal fever.

Present Illness.—Began before the birth of her first child five years ago, with frequent micturition, without pain or hæmaturia. Following the birth of the child she had hæmaturia, with pain and burning on voiding. Ever since the onset of her illness, over five years ago, the patient has been troubled with her bladder, the difficulty being at times slight, interfering with her work but little; and at other times severe, forcing her to go to bed. Recently, the trouble has been getting worse, her urine has been purulent, at times ammoniacal, and her general health has been poor.

Patient was first admitted to this hospital in March, 1902. A diagnosis of double pyonephrosis was made. Tubercle bacilli were never found in the urine; the patient was given tuberculin, but no reaction followed. Cultures taken from each kidney showed colon bacilli. At this time both ureters could be distinctly palpated and were thickened and tender. The ureteral orifices appeared like two large funnels. The patient was treated by rest and frequent irrigations of the pelves of both kidneys through renal catheters. She left the hospital, June 3, 1902, improved, and was readmitted one week later, and remained in the hospital one month, during which time the pelves of both kidneys were irrigated three times a week with a solution of silver nitrate, I to 500, followed by sterile water.

After leaving the hospital the patient remained home for

three months, and was readmitted October 5, 1903 Apparently the treatment in the bospital bad given her temporary relief only. The kidneys were irrigated, as on previous admission, until December 22 1902, when an incision was made into the left kidney by Dr Kelly, and a vesicovaginal fistula was also formed This was done because the bladder had become markedly inflamed and it was impossible to catheterize the ureters. A month later the vesicovaginal opening was enlarged and a suprapulic incision was made in order to give the bladder freer drainage. At the end of six months the patient's condition had improved but very little There was evidently a stricture of both ureters, for the left could be catheterized only with great difficulty and the right not at all Cultures from the left kidney showed a pure culture of B pyo cyaneus instead of the B coli communis as at the previous admission. The patient desired to go home, but before closing the vesicovaginal fistula in order that she might go, I determined to ascertain whether or not it would be safe to do so

On June 7, 1003, a catheter, which was connected with a funnel by rubber tubing, was inserted into the bladder, and the vesicovaginal opening was closed by a finger inserted into the vagina. Fluid was now poured into the funnel, and thus the bladder was filled until the distention caused discomfort but no actual pain. The patient stated that she could feel something passing up her ureters into her kidneys, which caused pain in both kidneys The fluid was withdrawn from the bladder Three hours later the patient's temperature rose to 1026° F She had a chill and severe pain in the region of both kidneys. The elevation of temperature and pain lasted four days, and gradually subsided. It was evident that the distention of the bladder caused a reflux of the bladder contents into the ureters, thus interfering with the function of the diseased kidneys and causing a reinfection of the kidneys with the clinical symptoms of pain and fever A closure of the vesicovaginal fistula would give rise to the same condition, for the diseased vesical portions of the ureters were rigid tubes, and were unable to prevent a reflux of urine when the bladder was distended

June 26, 1903, the right kidney was incised by the author making a nephrostomy

July 20, 1903, I resected the lower end of the left ureter and reimplanted it into the bladder by the extraperitoneal route under general anæsthesia. (Chart I.) Following the operation, the patient was very ill, with nausea and vomiting which lasted irregularly over a period of nearly two weeks, and a rapid, weak pulse. Patient recovered; ureteral orifice easily catheterized. Operation apparently successful, but later proved not to be. (See notes following the next operation.)

Because the patient had been so ill after the last operation and also after other operations referred to in this article, I decided to resect and reimplant the right ureteral orifice under local anæsthesia.

Resection of the Right Ureter and its Implantation into the Bladder by the Inguinal Extraperitoneal Route, through a low McBurney Incision, for Inefficiency of the Ureteral Orifice. September 8, 1903. Duration of operation, five hours and fifteen minutes. Anæsthetic, Cocaine (Schleich's Solution), where necessary.

An incision was made through the skin, infiltrated with Schleich's Solution, from a point three centimetres mesial and above the anterior superior iliac spine and extending down to the insertion of the rectus muscle in the pubic bone. The aponeurosis of the external oblique muscle was split open and the deeper muscles were exposed, and the fibres separated by blunt dissection, thus giving rise to a "gridiron incision" similar to McBurney's incision, and exposing the peritoneum. The deep epigastric vessels and the round ligament were cocainized, clamped, cut, and ligated.

The peritoneum was now dissected free from the abdominal wall and side of the pelvis, and the external iliac vessels were exposed and the hypogastric artery. The latter served as a useful guide to the uterine artery and the ureter. The ureter was found to be much thickened, about one and a half centimetres in diameter, and adherent to the surrounding tissues. The lower pelvic portion of the ureter was dissected free, it being necessary to clamp, cut, and ligate the uterine artery in order to accomplish this. The ureter was freed down to the bladder, where it was cocainized and cut across. A sound was introduced into the bladder through the urethra and the bladder wall was pushed out and opened near the end of the ureter. The end of the ureter was split into two flaps, and a catgut suture was passed through the end of the ureter and into the opening in the bladder and out of

\(\text{C-IMR} \text{I} \) \(\text{M-Amic} - \text{Mrs. I M Age, 32 Gyn, Nos 9495, 9795 and 11, 10? 12.} \)

Anasthetic -Nitrous oxide and ether Openation —Resection of the ureter (left) and its implinitation into the blackler by the inguinal extraperitonest route. Diagnosis - Inefficient ureteral orifices, permitting a retlux of urine from the blidder into the kidneys

Amount of Anasthetic -Nitrous oxide to stirt, ether about 340 grammes

2

100 80 70,	120	190 180
	- ·	Pulse rate for five days before the Operation
		esthetic began 1
	}	មិនយុធនៃ និស្នននេះជាមិននេះ មិនយុធនេះ និស្នននេះជាមិន
		2 Hours 2 to 25 to
-	1	ationended

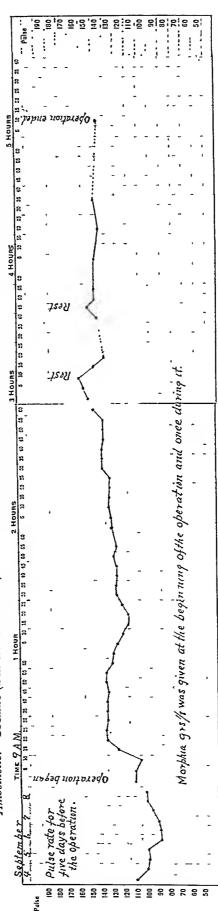
rapid, poor quality, patrent very ill Notice the even pulse rate after ratient is completely under an authente. Compare with Chvrt III Result patient recovered, the uteletovesical im plantation healed but the ureteral orifice was still inefficient permitting a redux of urine from the I ladder into the uriter Anaesthetic well taken pulse rather weak throughout the operation Convalescence marked to mausea and counting lasting trick until for nearly two weeks after the operation pulse

CHART II.

Name. - Same patient as Chart I.

Operation.—Resection of the right ureter and its implantation into the bladder by the inguinal extraperitoneal route, through Diagnosis.—Inefficient ureteral orifices, permitting a reflux of urine from the bladder into the kidneys. Date.—September 9, 1903.

Anasthetic.—Cocaine (Schleich's Solution) for the abdominal incision down to the peritoneum, and then where necessary. a modified McBurney incision down to the peritoneum.



pain; any change in position must be gradual and done earefully in order to avoid unnecessary pain. The effect of the operation was that of hard work, the patient felt "tired out." Had more frequent "rests" been made, the "work" would have been easier and the pulse would not have maintained sneh an even high rate, but would have been irregular. See Charts III, V, and VI. Re-Traction on the parietal peritoneum was the mann source of pain during the operation. In order to expose the field of operation, it was necessary to push aside the freed peritoneum; this caused sult, operation was successful, the ureteral stricture was cured, and the ureteral ornfice became efficient, a reflux of urine being impossible.

the urethra, and the ureter was thus drawn into the bladder, so that it protruded over one centimetre into the cavity of the bladder and remained there, while the ureter was situred in place with fine silk, taking care to suture the bladder wall to the ureter and not around it, so as to avoid a stricture

A piece of rubber tubing was placed transversely across the vaginal orifice and the catguit suture which had been passed through the end of the ureter and out through the urethra was tied around it in order to relieve the tension on the sutures fastening the ureter into the bladder. Gauze drains were placed down to the seat of the operation and the incision was partially closed.

Any procedure which made traction on the parietal perito neum caused pain as the separation of the peritoneum from the sides of the pelvis, traction on the ureter and freeing it, while pinching the ureter caused little or no pain. The uterine artery was clamped, cut and ligated without causing pain Pushing out the greatly thickened bladder with the sound introduced through the urethra and making the incision into its walls caused pain, while the actual suturing of the bladder to the ureter did not seem to cause pain. As the exposure of the field of operation required pressure on the parietal peritoneum, which had been freed from the abdominal and pelvic walls, this had to be done very carefully, and any change in position must be made gradu ally in order not to cause any unnecessary pain. The most painful part of the operation was suturing the abdominal incision at the close of the operation The patient stood the operation very well The pulse was rapid during the operation, at one time reaching as high as 160 The maintained high pulse-rate was due to the absence of frequent rests Had there been more rests, the pulse curve would have been irregular, as in Chart III of the same case, where rests of from two to five minutes were very frequent. also the operation would have been much easier for all concerned

The effect of the operation was that of hard muscular exercise, and the patient felt tired out. The general condition of the patient, aside from the fatigue, was the same after as before the operation. The convalescence was as rapid as might be expected in one recovering from the effect of several hours' hard work or from a long time spent in a dentist's chair. The operation was a success. The implantation healed and it was impossible to force fluid from the bladder into the right kidney, as shown by

the following. On November 11, 1903, the bladder was distended with a solution of methylene blue, and the patient stated that she could feel the fluid pass up the left but not up the right ureter. The bladder was now washed out with sterile water, and on making a cystoscopic examination the blue fluid could be seen coming out of the left but not from the right ureteral orifice. The ureters were catheterized, and the blue fluid was obtained from the pelvis of the left kidney but not from the right, thus demonstrating that the left ureteral orifice was still inefficient and permitted a reflux from the bladder, while the right ureteral orifice was functionally normal. The right ureter, having a diameter of fully one centimetre, projected into the cavity of the bladder for a distance of nearly one centimetre, while the orifice of the left one formed a funnel-shaped depression in the bladder. It was decided to again resect the left ureter and to try to imitate the condition present in the right.

Resection of the Left Ureter and Its Reimplantation into the Bladder by the Inguinal Extraperitoneal Route, for Inefficiency of the Ureteral Orifice. November 11, 1903. Duration of the Operation, Five Hours and Twenty-five Minutes. Anæsthetic, Cocaine (Schleich's Solution), where necessary.

The ureter had been resected and reimplanted into the bladder, July 20, 1903 (under ether), for an inefficient ureteral orifice, and the operation had failed, for when the bladder was distended with fluid the fluid passed up into the pelvis of the kidney. On the other hand, the reimplantation of the right ureter (under local anæsthesia), leaving a long piece of the ureter projecting into the bladder, was successful, and fluid could not be forced from the bladder into the pelvis of the kidney.

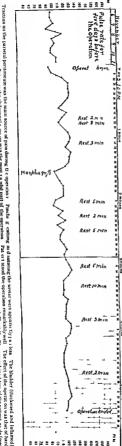
An attempt was made to imitate the implantation of the right ureter. The scar tissue caused by the previous operation, July 20, 1903, rendered the operation very difficult. The operation was done as the one described September 8, 1903, except that the ureter was higher up in the pelvis, and on that account was more accessible; but the adhesions from the previous operation made its exposure more difficult. As in the previous operation, any steps in the operation which made traction on the parietal peritoneum caused pain. On the other hand, handling and cutting the ureter, as well as suturing the ureter into the bladder, did not seem to cause pain, while making an opening into the bladder seemed



Name -Same patient as Charts I and II

Date - November 11 1903 Anasthetic —Cocaine (Schleich's Solution) for the abdominal incision down to the peritoneum rest of the operation Operation —Resection of the ureter and its implantation into the bladder by the inguinal extraperationeal route Diagnosis -Inefficient preter d orthoe (left) permitting a reflux of time from the bladder into the kidney

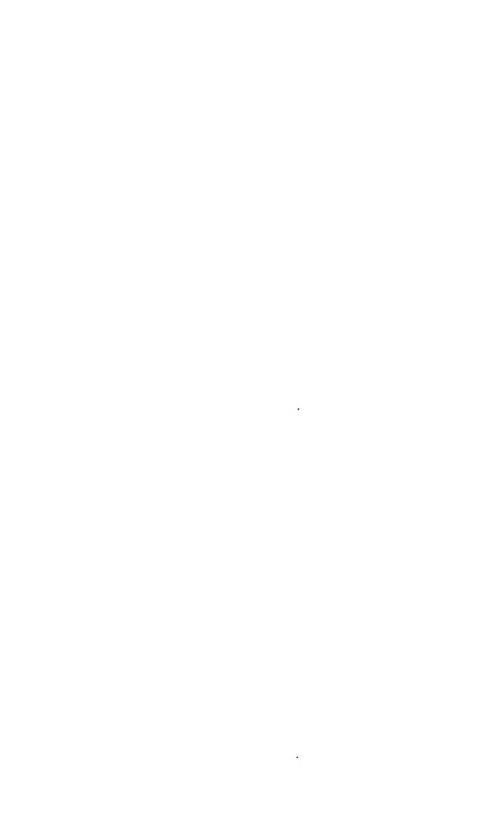
was done for the most part without an masshate



was apparently very sensure. Suturing the abdominal 1 cis on was the most 1 a nful part of the operation the fatigue was the same after as before the operation work the pat ent felt tired out Frequent rests caused a temporary fall in pulse-rate g ving rise to the irregular chait. Compare with Chart il The general condition of the patient as de from Result the ureterovesical impla tation healed but the ureletal orifice was still i efficient Pat er t stood the operation remarkably well. The effect of the operation was that of hard

successful

Chart II



to be painful. This operation differed from the one in the opposite side in that a small rubber male catheter about three millimetres in diameter was inserted into the ureter and out through the bladder and urethra and removed on the second day

As in the previous operation, the patient felt tired out, the convalencence was rapid, as one recovering from the effect of several hours' hard work. On comparing the pulse Chart III with the chart of the operation on the other ureter (Chart II), it will be noticed that in Chart III the pulse varied much in rate during the operation. This variation in rate was apparently due to the frequent rests. While operating, the hard work on the part of the patient causes an increase in the pulse-rate, which is lowered by a two to eight minutes' rest, again to increase in rate when the operation begins. Frequent rests with a chance to change the position of the patient make the operation caster for the ureter projecting into the bladder sloughed off, leaving a ureteral orifice which was inefficient, as it had been after the previous operation.

An attempt was made to dilate the bladder slowly and care fully, and so possibly compress the ureteral orifice and render it efficient, but this failed. The vesicovaginal fistula was closed and the old trouble returned, but it was umlateral instead of bilateral for the right ureteral orifice was able to prevent the reflux from the bladder. It was finally necessary to reopen the bladder and discharge the patient with a vesicovaginal fistula, which relieves all intravesical tension, and, under the circumstances, the patient will probably have to always have a vesicovaginal fistula.

Before beginning these operations, the patient had cystitis with bilateral renal infection, bilateral ureterity, and stricture and inefficiency of both ureteral orifices. As a result of the operations, the cystitis disappeared and the stricture of the ureteral orifices was cured, and thus the condition of both kidneys was much improved, and one ureteral orifice is efficient, while the other, after two ureterovesseal implantations, is unable to prevent a reflux of urine from the bladder if the bladder is closed. So it is necessary to have a vesicovaginal fistula in order to relieve intravesical tension, or else remove the left

kidney, which does not seem desirable, for fear of renal insufficiency of the opposite organ. A left nephrostomy could be done, but it would be difficult to maintain with a patulous ureter, and, besides, it has not many advantages over a vesicovaginal fistula.

CASE II.—Mrs. A. M., aged forty-eight years. Gyn. Nos. 10,622, 10,713. (Referred to in a previous communication.⁹)

Diagnosis.—Left ureterovaginal fistula, from necrosis of the ureter following hysterectomy for carcinoma cervicis uteri.

Operation.—Ureterovesical implantation, extraperitoneal, September 16, 1903.

Anæsthetic.—Cocaine (Schleich's Solution).

Contraindications to a General Anæsthetic.—Both ureters had been freed in the previous operation, leading to necrosis of the left ureter and the formation of a ureterovaginal fistula. The liability of renal insufficiency had to be considered, due to the interference with the function of the ureters. In addition, the patient dreaded a general anæsthetic.

HISTORY OF CASE.—Family History was negative; no history of cancer.

Personal History.—Always well. Married. Eight children. Present Illness.—Patient was admitted to the hospital, July 21, 1903, with a diagnosis of carcinoma cervicis uteri with symptoms of bleeding for eighteen months.

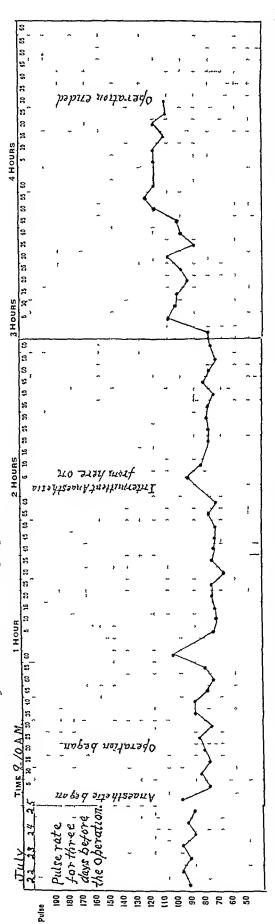
July 25, 1903, a more radical operation was done by the author. The ureters were dissected free, and an attempt was made to remove all the tissue from pelvic wall to pelvic wall. (Chart IV.) A lymph-node removed from the bifurcation of the left iliac artery proved to be cancerous. A left ureterovaginal fistula resulted, the escape of urine appearing on the thirteenth day.

The patient left the hospital August 27, 1903, with a ureterovaginal fistula, and returned October 10, 1903, desiring to have it closed.

DESCRIPTION OF OPERATION FOR THE CURE OF THE URETERO-VAGINAL FISTULA.—Duration of operation, six hours and ten minutes. A skin incision was made under Schleich's Solution, parallel to Poupart's ligament, beginning about three centimetres mesial to the anterior superior iliac spine and extending down to the inser



Operation - Abdominal hysterectory, with removal of the pelvic lymphatics and freeing the ureters CHARF IV Name.—Mrs. A M. Age, 48 Gyn, No. 10,622. Amount of Anæsthetic.—About 500 grammes Diagnosis.—Carcinoma cervicis uteri Date. — July 25, 1903. Anasthetic.-Ether.



An esthetic well taken, the last hour the pulse was weaker and more rapid. Compare with Chait V. Convalescence, aside from the formation of a meterovaginal fistula due to necrosis of the ureter, was uneventful. Discomfort, with nausea and voniting, which may follow a long operation under a general ancesthetic Result, recovery, ureterovaginal fistula closed September 15, 1903, under local anæsthesia See Chart V

Name -Mrs A M Date -Suptember 16 Age 46 Gyn Nos 10,622 and 10 713 (Sunte patient as Chart IV)

20022222 clinesthetic —Cocune (Schleich's Solution) for the abdomin it incision down to the paritoneum, and then where necessity Operation — Resection of the left irreter and its implinitation into the bladder by the inguin if extripctitones) route Diagnosts — Ureterovaginal fixtula Lat following areteral necrosis from freeing the areters in a more radical operation for c acomount cervices men See Chart IV

............

...........

l attent felt perfectly wel causing a rapid pulse (temporary) and foligue as that of a patient in a deptrate chair. Compare with Chart IV. The value of frequent' resis causing a temporary tall in the pulse rate was well brought out in this operation As its previous operations backet on the partical periodecum was the main source of pain Both the ureter (after free of it) and the bladder were apparently insersible to operative manipulation Rest In I The effect of the operation was that of hard work i.e. physical and nersous strain Result patient cured uncertal orifice apparently normal unable to catheterize it ---* * * * 5 5 6 5 5 5

tion of the rectus muscle. A similar incision was used through the muscles of the abdominal wall down to the peritoneum peritoneum was dissected free from the abdominal wall, and this was found to be very difficult, because it had been freed at the previous operation, the Poten incision having been used deep epigastric vessels were cocamized, clamped, cut, and ligated The separation of peritoneum was carried on down to the external iliac vessels, and the bladder was separated from the sides of the pelvis. The separation of the bladder from the walls of the pelvis did not cause any pain, on the other hand freeing the peri toneum was painful, requiring very slow and careful work the previous operation the round ligament and ovarian vessels had been sutured to the top of the vagma, and in order to reach the ureter, it was necessary to cut through these structures The ureter was found to be firmly embedded in adhesions, and with great difficulty it was dissected free down to a point about two centimetres above the bladder, where it became much smaller, being about 15 centimetres in diameter above this place, and filled with clear urine (cultures taken from this urine showed it to be sterile) The ureter was now cut off just above its strictured portion Clamping and cutting the ureter (not cocainized) did not cause any pain. The ureter was dissected free for its entire pelvic portion, so that it could be brought down to meet the bladder. After the distended ureter had emptied itself, much to my surprise, it resumed its normal appearance and size straight aneurism needle was now introduced into the urethra and the bladder wall was pushed out in the direction of the ureter and incised. This step in the operation did not cause pain. A caterit suture was passed through the end of the ureter and tied to the end of the aneurism needle On withdrawing the latter from the bladder through the urethra, the ureter was drawn into the blad der incision. The edges of the incision in the bladder were sutured to the ureteral wall by means of fine silk using five or six sutures, which included the muscular coats of the ureter and bladder The bladder wall at the site of the implantation was sutured to the side of the pelvis in order to fix the bladder at this place and relieve the tension of the implantation Additional sutures were also taken drawing the bladder up and fastening it to the psoas muscle. In spite of these sutures, the ureter was sutured into the bladder under considerable tension

Gauze drains were placed down to the site of the implantation, and an additional pack was placed on top of the bladder so as to hold the bladder down on the ureter.

The observations in regard to the sensation of pain seemed to be very trustworthy in this case. The abdominal incision down to the peritoneum was accomplished under cocaine (Schleich's Solution) infiltration, with very little pain. The only feature in the operation which seemed to cause pain was traction on the parietal peritoneum. All operative steps on the ureter, such as clamping, cutting, and suturing, were without pain; on the other hand, traction on the ureter and freeing it from its peritoneal attachments (i.c., traction on the parietal peritoneum) caused pain. All operative manipulations of the bladder, such as freeing it from the side of the pelvis, incising it and suturing it to the ureter and to the side of the pelvis at the site of the implantation, were apparently painless. In order to expose the field of operation, it was necessary to hold aside the freed peritoneum. This caused pain unless done very carefully, and any change in the exposure had to be done slowly and gradually in order to avoid unnecessary pain. The effect of the operation was that of hard work, manifesting itself in the fatigue after the operation and the rapid pulse during it. Had the operation been done without any rest, then undoubtedly there would have been maintained a high pulse-rate, as during prolonged exertion, somewhat as shown in Chart II; but with the frequent rests (the shorter ones not being charted) the rapid pulse manifested itself only when the operation was in progress and would fall as soon as the active operation ceased. (Chart V.) Morphia was tried, but did not seem to have much effect. Digitalin was also given to see if it would affect the pulse-rate, but it is questionable just what effect it had, for the apparent effect might have been due to the rest taken at that time. The patient felt as well after the operation as before, except for the fatigue. Apparently the patient and the operator were both fatigued as the result of the operation. What effect does pain have on the pulse? Lennander 10 speaks of the injurious effects of pain on a weak heart. A dentist thinks little of inflicting pain upon a patient for hours; and it seems to me that his operations are apparently as severe and frequently more severe than the one I have just described. The patient exercises her muscles in the following ways: The position, no matter how comfortable, becomes tiresome (the patient frequently changes her position), to exercise self control is hard work, besides, she does actual muscular work in grasping something with her hands or bracing her feet against some support. These procedures help the patient

After the operation the patient was asked how she felt, and replied that, aside from feeling tired, she felt well and was hun gry She asked for bread and butter and raw tomatoes for supper, which she ate with great relish and without any apparent evil effects

Result —The ureterovaginal fistula was cured There was no leakage of urine until the eighth day, when only about half the amount of urine was obtained from the bladder as on previous days, and there was an escape of a large quantity from the in gunal incision. This ceased in a few days, and the patient left the hospital cured. The bladder was examined before the patient left the hospital, and, while the end of the ureter could be seen protruding into the bladder, I was unable to catheterize it, and think that the ureter may have sloughed above the bladder, leading to a secondary fistula, which healed, but possibly with occlusion of the ureter, for the amount of urine obtained from the bladder each day did not reach the daily amount excreted during the first week after the operation

CASE III — Miss F P, aged nineteen years Gyn No 10 701 1/2

Diagnosis - Ureteral calculus, right (situated just above the bladder)

Operation —Ureterotomy, with removal of calculus through the inguinal extraperitoneal route, December 2, 1003

Anasthetic -- Cocaine (Schleich's Solution)

Contraindications to a General Anasthetic —Patient had ob structive anuna twice and each time was relieved by nephros tomy, in addition, a vesteovaginal and suprapulue fistula had been formed to relieve a very severe cystitis. She had taken a general anasthetic badly, and had been very ill afterwards, and on account of the above she desired to have this operation undertaken with a local anasthetic

HISTORY OF THE CASE -Family History was negative, no history of tuberculosis

Personal History -Negative, until present illness

Present Illness.—Six years' duration, with symptoms of a very severe cystitis,—frequency and painful micturition, urine at times bloody, incontinence of urine at night. No definite renal symptoms.

Patient admitted to this hospital, January 22, 1903. A diagnosis of cystitis was made. A vesicovaginal fistula was made February 4, 1903, by Dr. Kelly, and a suprapubic vesical fistula, March 4, 1903, by Dr. Schenck. Treatment consisted in bladder irrigations with a retention catheter, and the patient was placed in a tub of water. Patient had several attacks of fever with severe headache, without any definite localizing symptoms.

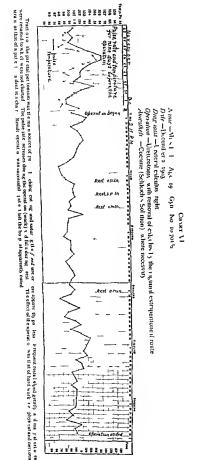
May 4, 1903. Anuria of six hours' duration. Localizing symptoms were rather indefinite, but on deep palpation there seemed to be a slight amount of tenderness under the right costal margin. A lumbar nephrotomy was done by the author, on the right side, the kidney was found to be enlarged, a large quantity of foul-smelling, purulent urine, with a small stone, escaped on opening the pelvis of the kidney. The operation was done under ether as a general anæsthetic.

July 3, 1903. Following the previous operation, the patient frequently had fever, with headache, nausea, and vomiting. During twenty-four hours previous to present operation there had been some slight pain and tenderness in the region of the left kidney, associated with the absence of urine in the bladder for eighteen hours. Nephrotomy wound on the right side was still discharging. Under ether anæsthesia, a nephrotomy was done on the left side, permitting an escape of a large quantity of purulent urine.

During the next month the lumbar incision in the right side would close, and associated with it there would be fever, but very few localizing symptoms. A ureteral catheter was coated with wax for its entire length, and on catheterizing the right ureter it was found to be scratched for a distance corresponding to a point just above the bladder. An X-ray was taken, and the shadow of a stone about as large as an orange-seed was seen just above the entrance of the ureter into the bladder.

DESCRIPTION OF OPERATION FOR THE REMOVAL OF THE URETERAL CALCULUS, DECEMBER 2, 1903.

Duration of operation was five hours and forty minutes. A skin incision was made under Schleich's Solution, beginning just





above and about three centimetres inside of the anterior superior inac spine and carried down parallel to Poupart's ligament to the insertion of the rectus muscle. The muscles were cut through down to the peritoneum, taking care to infiltrate the blood vessels with cocaine before clamping and cutting them. The peritoneum was pushed back from the abdominal wall. This caused pain, but by going slowly the patient was able to stand it. The round ligament and deep epigastric vessels were cocainized, clamped, cut and ligated. Both structures were apparently sensitive to pain. The freeing of the peritoneum from the sides of the pelvis also caused pain, but was accomplished by going slowly and infiltrating the subperitoneal tissue with Schleich's Solution. This latter procedure seemed to help but very little.

The ureter was exposed at the pelvic brim Traction on the ureter caused bann, on the other hand, pinching the ureter with mouse tooth forceps did not cause pain. The ureter was incised without causing pain. A wax coated catheter was passed up into the kidney No evidence of scratch marks. The catheter was next passed down towards the bladder, and on removing the catheter it was found to be scratched to a point within six centimetres of the opening in the ureter. The ureter was now exposed down to a point within 25 centimetres of the bladder. A second incision was now made into the ureter at this point without causing any pain, and the stone easily felt with a probe about two centimetres below the opening in the ureter. Attempts to dislodge the stone were unsuccessful, and it was found necessary to incise the ureter over the stone, which seemed to cause a slight amount of pain, and remove it through this incision. The incisions in the ureter were closed with fine silk without causing the patient any pain. The bladder was partially freed with but very little pain The uterine artery was clamped, cut, and ligated with out causing pain. The superior vesical artery was also cut, and some difficulty experienced in controlling it, thus emphasizing one of the disadvantages of operating under a local anæsthetic field of the operation was freely drained with gauze, and the skin and muscle incision partially closed with interrupted sutures of silkworm gut The closure of the skin incision was the most painful part of the operation

As in the previous operations under a local anæsthetic, the main source of pain came from traction on the parietal peritoneum, either in freeing it, maintaining an exposure by drawing it aside, or dissecting the ureter from it. The patient stood the operation very well, and the effect of the operation was that of fatigue. The patient felt tired out. The patient stated that she preferred an operation under cocaine to one under a general anæsthetic.

Result.—Patient recovered.

The vesicovaginal fistula was successfully closed, March 5, 1904, under ether. The patient desired to have it done under cocaine, but the exposure was very difficult, and the general anæsthetic permitted greater relaxation, and hence a better exposure; and there were not the same contraindications as at the previous operation, for the removal of the calculus permitted the kidney to recuperate, and the general condition of the patient was much better, and, besides, the operation was of short duration. May 14, 1904, the suprapubic vesical fistula was also successfully closed under ether. A previous attempt to close it under cocaine was unsatisfactory and failed. This attempt was much more painful than any part of the operation when the calculus was removed, the scar tissue about the fistula being very sensitive and difficult to excise. Patient discharged, June 10, 1904, apparently well. Capacity of the bladder was 120 cubic centimetres. She was advised to return in six weeks in order to have her bladder dilated.

In studying these four operations on the lower end of the ureter, by the extraperitoneal route, under a local anæsthetic, one not only has an opportunity to learn something about the advisability of the use of a local anæsthetic in these cases and the advantages of the extraperitoneal route, but, what seems to me to be of the greatest importance, a knowledge is obtained of the factors causing pain in these operations. A knowledge of the distribution of the sensation of pain in any part of the body is not only of assistance in choosing an anæsthetic for operations in that portion of the body, but may eventually help us in the interpretation of the symptoms arising from diseased conditions of these parts.

THE CAUSATION OF PAIN IN THESE OPERATIONS.—In all four operations, closing the skin incision was the most painful step in the operation, and anything causing traction on the parietal peritoneum, as has been emphasized by Lennander, ¹⁰

was painful, as, freeing the personeum from the abdominal walls and sides of the pelvis, traction on the ureter, and freeing it from its personeal attachments. In order to expose the field of operation, it is necessary to maintain pressure on the freed personeum, and thus is painful unless it is done earefully, and any change in position must be accomplished slowly

Apparently the ureter (freed from its peritoneal attachments) may be pinched, incised, and sutured without causing pain Is there any sensation of pain in the ureter, or is any nam which may be referred to it due to the stretching of nerves in the parietal peritoneum covering the pelvic portion of the ureter? The passage of a ureteral calculus is supposed to cause ureteral pain. One may inject the ureter with fluid through a ureteral catheter and pain will be felt in the region of the kidney, this being a very efficient means of locating obscure pain in the side, as has been described by Kelly 11 We realize, too, that the palpation of a diseased ureter may be painful. The histories of cases of intentional or accidental ligation of the ureters help us but very little. We have discovered that a ureter has been accidentally occluded by ligatures in three gynæcological cases in this hospital which have come to autopsy, and yet there were no symptoms referable to the mury, or such as might have been present were obscured by other symptoms resulting from the operation Two of these three cases have been reported 12 Noble 18 refers to a similar experience, and the cases reported by Vert.14 Bastranelli,16 and Phaenemenow,16 where a ureter was intentionally ligated, the patient recovered without any symptoms referable to the mury, while in a case reported by Futh 17 and also one by Landau.18 the symptoms were those of a sense of fulness or dull pain in the region of the kidney I saw, in consultation, a patient in whom both ureters had been cut off and ligated for thirty-six hours, and yet anuria was the only symptom present, and both ureters, which were greatly distended, were released and reimplanted in the bladder, and the patient recovered Bailey has reported an instance of the ligation of both ureters and their release after forty eight hours,

with recovery, and anuria was the only symptom. cell's ³ case of ligation of both ureters, with subsequent release at the end of fifty-eight hours and recovery, there were not any localizing symptoms until the third day. Markoe and Wood 4 report a case of accidental ligation of both ureters of twentyfour hours' duration, and yet there were no symptoms distinctly referable to the injury. In the repair of a vesicovaginal fistula in this hospital a ureter was apparently included in a ligature. Pain in course of ureter for four days, with chills and fever, which disappeared on releasing some of the suture. another instance (Gyn. No. 11,164) where a vesicovaginal fistula was made, in order to relieve a cystitis, and the mucosa of the bladder was sutured to that of the vagina, apparently one of the sutures occluded or compressed the ureteral orifice, for there was pain and tenderness in the region of the left kidney, which was relieved by releasing the suture. In these last two cases one could not tell whether one was dealing with partial or complete occlusion of the ureter. It is possible that the ureter may be completely occluded and the patient's convalescence be uninterrupted and entirely without any symptoms referable to the injury. Stoeckel 19 has referred to the above, and states that in the absence of infection there are often apparently no definite symptoms, or such as there are may be easily obscured by the symptoms following such an operation; and the other kidney, if sound, can readily adjust itself to the additional work, and so prevent the threatened uræmia.

EFFECT OF THE OPERATIONS ON THE PATIENT.—By studying the pulse-rate during the operation, it may be seen that it increases in rate during the active operative manipulations and drops as soon as these stop. If frequent rests are taken, the pulse-curve becomes very irregular (Charts III, V, and VI), while, if the rests are less frequent, a higher and more even pulse-rate is maintained throughout the operation (Chart II). Several factors influence this pulse-rate, as, hard work, for it is equivalent to hard muscular exercise (the patients like to brace their feet against something or grasp something firmly with their hands); the excitement and mental

strain must also influence the rate, and possibly the pain also increases the pulse-rate. The result of the above is that the patient becomes fatigued, and the only apparent effect of these operations, lasting from four hours and thirty minutes to six hours and ten minutes, was that of fatigue, just as one might feel after spending several hours in the dentist's chair. The patients stood the operations very well, and all stated that they preferred local to a general aniesthetic

UPON WHAT DOES THE SUCCESS OF THESE OPERATIONS
DEPEND?—I In knowing what does and what does not hurt,
and thus avoiding all unnecessary pain Severe pain will unfit
the patient for any further progress of the operation, unless a
general amenthetic is used

- 2 In going very gradually and carefully and avoiding any sudden moves, which is especially true in exposing the field of operation
- 3 In stopping frequently in order to let the patient rest and change her position
- 4 In choosing suitable patients, and letting them know just what to expect, so that they may help you in the deter mination of what hurts, in order that unnecessary pain may be avoided.
- 5 In the presence of a so-called "moral anæsthenst," who will encourage the patient and divert her attention when neces sary
- 6 The use of morphia before and during the operation probably helps in some cases. A towel over the eyes of the patient, so she cannot see what is going on, and cotton in the ears to muffle any sounds from the use of instruments also helps.

I was tempted to try a local anæsthetic in the first case on account of the contraindications of a general anæsthetic, for it seemed that an operation would have to be done under a local anæsthetic or further operative attempts abandoned. The sat isfactory use of local anæsthesia in the radical cure of certain cases of herma, as reported by Cushing, 20 seemed to me to offer inducements for its use in the surgery of the lower ends of the

ureters by the inguinal extraperitoneal route. The satisfactory result of the first operation on the first case induced me to try it in the next three operations, and all three cases having had operations under both a local and a general anæsthetic, while admitting that the operation under local anæsthesia at times was painful and very fatiguing, prefer local to general anæsthesia.

The solution of cocaine used was:

Cocainæ hydrochloratis	0.1	gramme
Morphinæ hydrochloratis	0.02	gramme
Sodii chloridi	0.2	gramme
Aquæ destillata ad	100	cubic centimetres

About thirty cubic centimetres of this solution are placed in a small flask and sterilized with the dressings in a steam sterilizer.

THE CHOICE OF AN INCISION, AND THE INGUINAL EXTRAPERITONEAL ROUTE AS AN AVENUE FOR EXPOSING THE LOWER END OF THE URETER.—By the inguinal extraperitoneal route, one refers to an abdominal incision down to the peritoneum, and then the peritoneum is pushed away from the abdominal and pelvic walls, and thus the field of operation, in which the lower end of the ureter lies, is exposed. Various incisions have been employed for this route.

Twynam,²¹ in 1890, employed this route for the successful removal of a ureteral calculus, situated two inches above the bladder, in a boy eight years old. His incision was similar to one used for the ligation of the common iliac artery. Since Twynam's case, this route has been used by others for the removal of calculi in the lower end of the ureter. See table of cases compiled by Schenck.²²

Rouffart,²³ in 1895, suggested making an incision along the outer border of the rectus, dissecting the peritoneum from the pelvic wall, and thus exposing the lower end of the ureter, for the resection of the ureter and its implantation in the bladder for the cure of ureterovaginal fistulæ.

In 1898, Kelly 24 employed the extraperitoneal route for

the cure of an ureterovaginal fistula. The incision was fifteen centimetres long, and began two centimetres inside of the right anterior superior iliac spine and ended near the pubic spine Somewhat similar incisions were employed in operations in Cases I, II, and III

The following year Israel ²⁵ reported a similar but more extensive incision for the successful resection of an urreteral structure and implantation of the ureter into the bladder

Mackenrodt,²⁶ in 1899, reported a ureterovesical implantation by the extraperitoneal route, using an incision along the outer border of the rectus muscle, as suggested by Rouffart

Crossed, curved abdominal incisions have been made by Werthein 27 and others

Smth,²⁸ in 1901, used an incision in the median line for the same purpose

One sees that almost as many incisions have been used for this route as there are possibilities, and it seems almost useless to add others Nevertheless, it seems to me that an intramuscular incision, in which the muscle fibres are not cut, offers advantages over the above, in that there is less injury, and also less danger of a postoperative herma, for I believe in the extensive draining of the field of operation One incision which I have found very useful for exposing the lower end of the ure ter is a so-called "gridiron incision," made similar to the well known McBurney incision, down to the peritoneum, except that it should be made a little lower down. Such an incision was used in Case I Another serviceable incision is a longitudinal one through the rectus muscle I have tried all the various in cisions above referred to except the transverse abdominal incisions, and I think that the two intramuscular incisions referred to, in which the muscle fibres are separated but not cut, are to be preferred to the others, and by either of these incisions the ureter can usually be exposed from the pelvic brim to the bladder, and if more room is desired, the muscles may be cut at any time.

CONCLUSIONS.

- I. In favor of the use of a general anæsthetic it may be said:
- 1. The patient is unconscious of everything associated with the operation, including the pain.
- 2. There is complete relaxation, thus permitting a better exposure of the field of operation, which is especially desirable in operations in the pelvis.
- 3. The operation takes a much shorter time than a similar operation under a local anæsthetic.
- 4. The operation is easier, and all the above render it possible usually to do better work than under a local anæsthetic.
- II. There are many disadvantages in the use of a general anæsthetic.
 - I. In certain cases it is contraindicated.
- 2. A small percentage of the cases die on the table from the anæsthetic alone.
- 3. In all cases it lowers the general resistance of the individual, thus predisposing the patient to many postoperative complications.
- 4. The taking of the anæsthetic is usually very unpleasant, and the recovery from it still more so.
- III. If certain operations do not cause any pain and very little discomfort, why should patients be subjected to the dangers and discomforts of a general anæsthetic in these operations? And if certain steps in a long operation, where a general anæsthetic is contraindicated, are painless, why not use a temporary general anæsthetic, such as nitrous oxide, or a local anæsthetic, as cocaine, *only* for that part of the operation which causes pain?
- IV. A knowledge of the distribution of the sensation of pain in the various parts of the body is not only interesting from a physiological stand-point, but especially valuable in the diagnosis of diseased conditions, and the *intelligent* use of a local or temporary anæsthetic in those cases in which a general anæsthetic is contraindicated.
 - V. Pathological conditions of the lower ends of the ure-

ters usually impair the function of the ureters, either interfering with the passage of urine from the kidneys to the bladder or permitting a reflux of urine from the bladder into the kidneys. In either instance the result is interference with the function of the kidneys and a condition of actual or unstable renal sufficiency results, thus lowering the general resistance of the individual, and in addition predisposing the kidneys to infection. The result of the above is that such individuals may not be well suited to a long operation under a general ancesthetic, which may be necessary to cure the local condition.

VI In four operations on the lower ends of the ureters by the inguinal extraperitoneal route under local anaesthesia, lasting from four hours and thirty minutes to six hours and ten minutes, the only apparent effect of the operation, aside from postural discomfort and at times some pain (endurable), was that of fatigue, as of a similar length of time spent in a dentist's chair.

VII The success of these operations is dependent on a knowledge of what does and what does not hurt, and on pro ceeding slowly and carefully, remembering that anything causing traction on the parelal personeum is painful. Pinching, cutting, and suturing the ureter in these cases apparently did not cause any pain, and similar treatment of the bladder in one case was painless but painful in another (bladder much thickened, chronic cystitis). Closing the abdominal incision was the most painful step in all four operations.

VIII The extraperitoneal route is a very satisfactory way of reaching the lower ends of the ureters, and would be less painful than the intrapentoneal, and has many advantages over the other. The danger from infection is less, by draining freely, the retroperitoneal tissue is well protected and the intestines are kept back by the peritoneum, thus giving one a good exposure, and there must be less shock associated with the extraperitoneal than with the intrapentoneal operation.

IX Many incisions through the abdominal wall have been used for the extraperitoneal route, and the intramuscular incisions can be recommended, as doing little harm, rendering the

liability of postoperative hernia small, and affording a good exposure. Two incisions are very good; first, a "gridiron incision" lateral to the rectus similar to the well-known McBurney, only a little lower; and, secondly, a longitudinal incision through the rectus muscle. Through either incision the ureter can usually be exposed from the pelvic brim to the bladder, and if more room is desired, the muscles may be cut at any time.

REFERENCES.

- ² Sampson. The Pelvic Ureteral Sheath: Its Relation to the Extension of Carcinoma Cervicis Uteri. The Journal of the American Medical Association, 1904, xliii, 707-712.
- ² Zweifel. Festschrift zur Einweihung der neuen Universitats Frauenklinik zu Leipzig, Berlin, 1892. Quoted by Hochstetter, Arch. f. Gyn., 1894, xlv, 109.
- ^a Purcell. British Gynæcological Journal, 1898, liv, 174.
- ⁴ Markoe and Wood. Uretero-ureteral Anastomosis for Traumatism. Annals of Surgery, 1899, xxix, 694-697.
- ⁵ Neumann. Drei Fälle von operativen Ureterläsionen. Hygiea, Band lix, 11, 598. Ref. Cent. f. Gyn., 1899, xxiii, 1184.
- ⁶ Bailey. Vaginal Hysterectomy for Adenocarcinoma of the Cervix Uteri. The Clinique, 1903, xxiv, 41-46.
- Bevan. The Surgical Treatment of Anuria. Annals of Surgery, 1903, xxxvii, 575-591.
- ⁸ Sampson. Ascending Renal Infection: with Special Reference to the Reflux of Urine from the Bladder into the Ureters as an Etiological Factor in Its Causation and Maintenance. Johns Hopkins Hospital Bulletin, 1903, xiv, 334–352.
- ⁹ Sampson. Complications arising from Freeing the Ureters in the More Radical Operations for Carcinoma Cervicis Uteri, with Special Reference to Postoperative Ureteral Necrosis. Johns Hopkins Hospital Bulletin, 1904, xv, 123-134.
- ¹⁰ Lennander. Observations on the Sensibility of the Abdominal Cavity. Translated by Barker, 1903. John Bale Sons and Daniel & Sons, London.
- ¹¹ Kelly. The Use of the Renal Catheter in Determining the Seat of Obscure Pain in the Side. American Journal of Obstetrics, 1899, xl, 328-334.
- ¹¹ Sampson. Ligation and Clamping the Ureter as Complications of Surgical Operations. American Medicine, 1902, iv, 693-700.
- ¹² Noble. Clinical Report upon Ureteral Surgery. American Medicine, 1902, iv, 503.
- ¹⁴ Veit. Ueber Heilung einer Ureterenverletzung. Zeit. f. Geb. und Gyn., 1895, xxxi, H. 2, 454.
- ¹⁸ Bastianelli. Ann. di Obstet. e. Gin., Milano, 1896, xviii, 134.

"Phaenemenow Ein interessanter Fall von Ureterverletzung beim Bauchschnitte. St. Petershirger Geh Gyn. Gesellschaft, 1000. February 17-20. Ref Cent f Gyn. 1001. XXV. 22

"Futh Beitrag zur Behandlung Ureterenberletzungen Cent f Gyn. 1808 XXII. 720-737 "Landau Nierenausschaltung durch Harn leiter unterbindung Deutsche

med Wochenschrift, 1000, xxvi, 749-750. "Stoeckel Urcterfisteln und Ureterverletzungen Breitkoof and Hartel.

Leinzig, 1000, S 27-28. M Cushing The Employment of Local Amesthesia in the Radical Cure

of Certain Cases of Hernia, etc. Annals of Surgery, 1000, xxxi, 1-34. "Twynam A Case of Calculus impacted in the Ureter, Removal Transactions of the Clinical Society of London, 1800, xxiii, 03-07

"Schenck The Symptoms, Diagnosis, and Surgical Treatment of Ureteral

Calculus The Johns Hopkins Hospital Reports, Vol x, Nos 6-7, 8-9, 477-513 "Rouffart Ann des Mal Gen Urin . 1805, xiii, 172

*Kelly Ureteral Anastomosis American Gynzecological and Obstetrical Journal, 1808, x11, 725-741

"Israel. Beitrag zur Ureterchirungte. Freie Vereiningung der Chirungen. Berlin, February 6, 1800. Ref Berliner klin Wochensehrift, 1800.

XXXVI, 20I *Mackenrodt Die Operation der Ureterfisteln und Ureter verletzungen

- Cent. f Gyn. 1800, xxiii 318-323 "Wertheim, Beitrage zur Ureteren Chirurgie, Monat Geb und Gyn.
- 1000, XI, 438-452 "Smith A Case of Transplantation of the Ureter for the Cure of Uretero
 - vaginal Fistula Philadelphia Medical Journal, 1001, viii, 655-657

PRIMARY URETHRAL CALCULUS.1

WITH REPORT OF A CASE.

BY HERMAN E. WOLF, M.D.,

OF CHICAGO,

Resident Physician, Cook County Hospital.

(From the Pathological Laboratory of Cook County Hospital.)

On account of the rarity and size of the calculus found in the urethra and the absence of symptoms, the following case is thought worthy of reporting.

Abstract from Clinical History.—The patient, male, aged fifty years, works in dyes used in staining tanned hides; no previous illness except gonorrhea twenty years ago; denies syphilis or its symptoms; uses alcoholic beverages freely. When admitted to the Cook County Hospital, service of Dr. Sherwood, April 8, 1904, he had a marked cirrhosis of the liver, and cellulitis of the leg following a slight injury. Two specimens of urine were examined and found clear, amber colored, distinctly acid, no sediment; the first having no albumen and the second only a trace. Blood count showed leucocytosis of 12,000. After running a septic course, death occurred April 19, 1904.

Anatomic Diagnosis (Dr. Stober).—Suppurative cellulitis of the leg; syphilitic cirrhosis of the liver; chronic nephritis; chronic hyperplastic splenitis; varicose veins of the œsophagus and abdomen; ascites; passive hyperæmia of the viscera; sclerosis of the aorta; obliterative fibrous pleuritis of the right side; hyperplasia of the tracheobronchial lymph glands with calcification; multiple calculi in the urethra.

The serious septic condition of the patient and the total absence of symptoms pointing to the involvement of the genitourinary tract caused the calculus to be overlooked during the life of the patient. The calculus weighs 23.62 grammes, is some-

Read before the Chicago Pathological Society, October 10, 1904.



Fig. 1—Pents and ured a split ventrally. Arrow at left of figure shows direction of unity vertext a_s larger mass of the calculus b posterior protrusion joining larger mass by parrow needs, ϵ

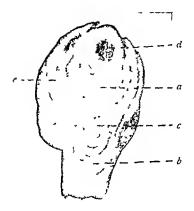


Fig. 2—Longitudinal section of the calculus showing the egg-shaped nucleus (d) with the empty cavity at its anterior end, and also showing concentric arrangement of the layers in both the main body (a) and the posterior protrusion (b), e shows portion lodged in the diverticulum on the dorsal side of the penis, and e, the narrow constriction at the posterior brim of the diverticulum.

what irregular in contour, and appears to be made up of two ovoid constituents fused together as they lay in contact by the deposition of urinary salts. The dimensions of the larger mass ((a) Fig 1) are, length three, width 2.4, thickness 33 centimetres. To this is added posteriorly another part ((b) Fig 1), joining the former by a slightly narrowed neck ((c) Fig 1). This is ovoid in shape and measures 16 centimetres in length and 12 centimetres at its greatest diameter. The greater part of the surface is smooth and of a yellowish brown color, notably the upper surface, which in reality forms the floor of the urethra, while the portion measuring two by three centimetres, lying in a distinct diverticulum, is gently faceted, owing to the presence of 130 or more small millet-seed sized, grayish concretions which stud the lining of the sac, and is of a dirty gray color.

On section longitudinally, the calculus is found to be com-

posed of easily discernible concentric layers, either complete or posed of easily discounties a prominent nucleus ((b) Fig 2), which is about the size of a sparrow's egg and bears marked resemblance to the same in shape, lying with its small end in the direction of the urmary current, as indicated by the arrow in Fig 1 The nucleus has in itself a pea sized cavity (Fig 2) containing a small amount of phosphatic debris It may be readily inferred that this cavity was originally a mass of organic matter consisting of blood, pus, or some other inflammatory product, resulting from the patient's early gonorrhos or some trauma, forming the nucleus for the future deposit, and as the morganic salts were deposited as a thin shell, the organic matter was broken down and removed by a process of osmosis leaving an empty cavity Posteriorly this cavity is bounded by three well marked crescentric layers of considerable density, each crescent increasing in extent towards the periphery About these and forming the only wall at the anterior end of the cavity is a layer approximately only one millimetre thick, constituting, as it were a shell for the egg-shaped nucleus This egg-shaped mass lies at the anterior end of the whole calculus, and has about itself a gravish loose layer, thickest posteriorly Upon this follow a number of yellowish brown crescentric layers, also increasing in extent outward and of considerable density These crescents are small where the calculus reaches the posterior brim of the diverticulum and make up the bulk of this posterior protrusion ((b)

Fig. 2). Surrounding the mass, except at its most anterior point, is a grayish zone, soft and granular; and this is covered by the outermost layer, complete, one millimetre thick, hard, brittle, and only loosely cemented to the preceding layer.

As to its relation to the urethra, the calculus occurred in the pars pendula of the penis; its foremost point being 5.4 centimetres posterior to the meatus urinarius externus, while the rear portion is ten centimetres distant from the same point. The anterior inferior portion ((e) Fig. 2) is lodged in a diverticulum lying in the median dorsal surface of the urethra. This pocket, or diverticulum, closely fits about its contents, but evidently has permitted of some motion of the same, as deposition has occurred uniformly on this included surface as well as on the free surface of the calculus. The wall of this sac is made up of all the normal coats of the urethra, including the mucosa. It is slightly thickened with some preponderance of fibrous tissue, especially at the anterior portion. The remainder of this calculus encroaches upon the lumen of the urethra, converting the same into a crescentric slit for the extent of itself, but evidently not interfering with the passage of urine.

After a thorough investigation of the literature, Professor Englisch, of Vienna, has collected 405 cases of urethral calculi, and classifies them as to age and localization as shown in Table I, and composition, as shown in Table II.

In the accompanying Table I, given by Englisch, it is evident that the number of cases of urethral calculi increases decidedly as the upper portions of the urethral tract are approached,—there being 41 cases in the fossa navicularis; 53 in the pars pendula; 50 in the pars scrotalis; 68 in the pars bulbosa; and 149 in the pars membranica. This division into these respective parts is based upon certain normal anatomic peculiarities which figure in the lodgement and formation of urethral calculi and depends upon the following characteristics. The external urinary meatus is the narrowest portion of the urethra, and has back of it an expansion, the fossa navicularis, which terminates posteriorly by a narrowed communication leading to the pars pendula. Anteriorly the bulbous urethra has a nar-

TABLE I (ENGLISCH)

Age	Number	Fossa Navicu jaris	Pars Pendula	Pars Scrotal s	Pars Bulbosa	Pars Membranica	Undetermined
1	5 23 6	1	2	1		1	
2	23	2	1	6	4	7	3
3	6	2	ĺī	2	4	(6	ő
3 4 5	14 6 12 5 4 7 10 35 22 26 15 24 23 27	2 7 1 1 1 1 1 4 2 3 4 0 2 2 0 1 0	1 1 2 3	r	1	1 4	
5	6	i i	2	(o	1	4 1 3 2 1	1
6	12	1	3	2 I	1	3	2
7	5	1	ŏ	1	0	2	1
7 8	4	1	1	io	1	1	0
9 10 11-15	7	1	1	1	2	2	۰
10	10	I	1	0	4 7 2	3 17 6 16 7 8	I
11-15	35	4	1	5 4 3 2 1 5	7	17	1
	22	2	2 2 1 3 3	4	2	6	4
21-25	26	3	2	3	2	16	
25-30	15	4	2	(2	0	7	0
31-35	15	0	1	1	4	8	1
21-25 26-30 31-35 36-40	24	2	. 3	5	5	5	4
41-45 46-50	23	2	3	l i	4 5 4 8	5 11 8 5 8	4 2 3 1
46~50	27	0	6	2	8	8	3
51-55	11	1	0	2 2	2 2	5	
56-6o	12	0	0	2	2	8	٥
51-55 56-60 61-65 66-70 71-75 76-80	3 13 4 2	a	5	I I	0	2	0
66-70	13	0	1 5	1	1	5 2	1
71-75	4	٥	0	2	٥	2	٥
75-80	.2	0	0		0	1	18
Undetermined	18	15	13	5	16	24	18

TABLE II (ENGLISCH)

	Urates	Oxalates	Phos- phates	Urophos- phates	Oxalat Phos- phates	kohlen Phos- phate kaik
Fossa Navicularis Pars Pendula Pars Scrotalis Pars Bulbosa Pars Membranica Undetermined Total	3 5 5 2 4 2 21	4 2 1 6 2 1	2 6 5 4 9 1	1 6 4 2 4 2	1 0 0 4 1	0 2 0 1 1 0 4

rowed outlet, while posteriorly the transition is effected through the resistant anterior leaflet of the triangular ligament into the pars membranica, which has a corrugated surface and is easily distensible. Thus we have a constriction or resistance and a distended or distensible portion posterior to it, where any object passing along the urethra may be arrested, and yet not completely occlude the canal. Under such occasions there may be a ball-valve action of the calculus, a phenomenon well illustrated by some of the reported cases, and also in another case which came under my observation recently, where the calculus had passed all obstructions down to the fossa navicularis, causing partial obstruction at intervals, until, at the external meatus, occlusion became complete and could only be removed by surgical means. Besides these physiologic anatomic conditions, we have certain pathologic ones which play even greater part in securing lodgement or aid in the formation, *in situ*, of such calculi, and will be discussed later.

As to age, Table I shows that, although distributed over four-fifths of the century at certain periods, we have increased prevalence. Especially early, at about the second year, the number of cases is high, perhaps due to congenital narrowness of the urethra. Again, from the eleventh to the fifteenth year, during adolescence, where we may assume, according to Englisch, that the hyperæmia incident to puberty is a factor. Another favorable period is early manhood, when inflammatory reactions, gonorrhæal or traumatic, are prone to occur and constitute some organic obstruction or form material for an organic nucleus for future deposit, while between thirty-five and fifty strictures resulting from such inflammations play an important part.

The chemical composition has also been studied in ninety-four of the reported cases and judged to be as given in Table II. In the case under discussion, a complete chemical analysis was made, and the calculus was found to be purely phosphatic, with a minimum amount of organic material. (Analysis of the different layers being made separately.)

Although but few cases have been reported where the higher urinary passages showed an associated condition, Kaufmann and Englisch hold that calculi retained in the urethra are usually secondary, having been preformed at higher levels and arrested in their passage, but they may be greatly modified after having become lodged. This may be true where the urethra is

normal and perhaps with urate and oxalate calculi, yet there are cases where the primary origin in the urethra seems undoubted, especially where there coexists dilatations or diverticulæ of considerable size, where urinary stasis can take place, similar to that in the pelvis of the kidney or in the bladder. Such di verticulæ can originate in various ways and may be true, containing all the coats of the normal urethra, or false, being a sac communicating with the urethra, but containing none or only parts of the coats, although often lined with a membrane which closely resembles the normal mucosa True diverticulæ may be primary, and, as such, may be congenital or acquired. The congenital forms may arise in various ways, namely, (1) failure of the genital folds to unite for their entire extent, thus leaving fissures or pockets, (2) agglutination of the urethral surfaces at the narrowest parts above mentioned during the first few months of intra-uterine life and a resulting dilatation posterior to the same, (3) congenital strictures or valves may cause a similar result. As previously stated, true diverticulæ may also be secondary or acquired, and then usually follow strictures of inflammatory origin, mainly gonorrheal, but occasionally trau matic More rarely they follow lodgement of a calculus in a normal urethra, with accompanying pressure atrophy and absorption of the surrounding tissue False diverticulæ, the anatomy of which has already been alluded to, are cavities communicating with the urethra following periurethral abscess (Kaufmann), or rupture of the urethra with urinary infiltration and resulting breaking down of the tissues involved (Englisch) Occasionally we have a pocket formed in the pars bulbosa by a distention of Cowper's glands with inflammatory products (Englisch)

In the case under discussion we have evidently one of primary urethral calculus. The sac is that of a true diverticulum in structure, whether congenital or acquired late in life cannot be demonstrated, but evidence is in favor of the former, as no organic stricture can be detected anterior to the same. The nucleus of organic matter is readily explained by the erify gonorrhoea, with, perhaps, injections as treatment. This nucleus,

floating anteriorly, as far as possible, had added to it, mainly posteriorly, layer after layer of phosphatic deposit until the present dimensions have been reached, the smaller concretions forming between it and the wall of the sac as the calculus became less mobile. The urine showed marked acidity, and, as the patient was suffering from cirrhosis of the liver, for that time has probably been acid, favoring deposits of oxalates and urates instead of phosphates (Purdy). Therefore the entire concretion has presumably antedated this malady. It may, however, have occurred at a period when the urine was alkaline from a complicating cystitis, during periods of phosphaturia, or, perhaps, the alkaline tide, the alkalinity after meals being sufficient to secure phosphatic deposit which the acidity of the interim was unable to dissolve.

BIBLIOGRAPHY.

Englisch, J. Über eingelagerte und eingesackte Steine der Harnröhre. Archiv für klinische Chirurgie, 1904, lxxii, 487.

Englisch, J. Über angeborne Verengerungen und Erweiterungen der männlichen Harnröhre. Archiv für Kinderheilkunde, 1881, ii, 85, 291.

Englisch, J. Über Obliteration und Erweiterung der Ausführungsgänge der cowprischen Drüsen. Jahrbücher der Gessellschaft der Ärzte in Wein, 1883.

Kaufmann. Text-book, Specialle Pathologische Anatomie II Auflage, 1901, 754 (Berlin).

Purdy. Practical Urinalysis and Urinary Diagnosis, 5th Edition, 1900, 56; also 350 (Philadelphia, Pa.).

CASE OF BONE TRANSFERENCE.

USE OF A SEGMENT OF FIRULA TO SUPPLY A DEFECT IN THE TIRIA.

BY THOMAS W HUNTINGTON, MD.,

OF SAN FRANCISCO.

Professor of Surgery in the University of California

THE following case illustrates the possibility of supplying a tibial defect amounting to absence of nearly the entire diaphysis by the appropriation of a corresponding portion of its companion, the fibula

In a paper published in the Journal of the American Medical Association, February 3, 1004, Nichols, of Boston, discussed this subject very ably and at great length. In this paper the author reported eleven cases, showing that in many instances, particularly where the defects were of minor dimensions, by preserving the periosteum, there was complete reproduction of bones with the attainment of satisfactory results so far as weight bearing and function were concerned. Two of Nichols's cases were similar to my own, in that there was almost entire loss of the diaphysis of the tibia. In the first of these cases, after four months, a radiogram showed nearly complete regeneration of the shaft, but with a conspicuous deformity due to marked anterior bowing. At this time the patient disappeared, and there was no record as to functional end result. The second case was reported as a functional failure after the lapse of several years

In entering upon this undertaking, I recognized that a central segment of the fibula firmly fixed to the tibu at both ends by bony union would carry with it its own nutrient supply, and that this would be largely increased by the more generous nutrition of the host. Assuming this to be true, I reasoned that the bridge of fibula so formed would rapidly expand, and in reasonable time approximate the dimensions of the larger bone,

thereby insuring a satisfactory condition as regards weightbearing.

Furthermore, I believed that, as the important relations of the lower extremity of the fibula were to remain undisturbed, the integrity of the ankle-joint would be preserved and locomotion be unimpeded.

The early history of the case is that of an acute, infectious, osteomyelitis of the left tibia. The patient was a lad of seven years, who entered the City and County Hospital of San Francisco Family history was unimportant. The trouble in May, 1902. began a few days before entrance. At that time, while at play, he sustained a slight injury to the left leg just below the knee. Leg became swollen, tense, and acutely tender. There was high temperature succeeding a chill. The attending physician made a small incision about three inches below the knee, from which, at time of admission, there flowed a small amount of clear yellow fluid. Tibia was extensively denuded, and near the ankle there were two red fluctuating areas. An incision along the spine of the tibia from the tubercle to one inch above the anklejoint revealed the fact that nearly the entire shaft was disintegrated. Pus oozed through several sinuses leading to the medullary cavity. On stripping the periosteum, the cortical portion of the bone was readily scooped out with a curette, leaving a trough of periosteum. Having in mind the possibility of bone reproduction, the periosteum after being carefully cleansed was stitched into a tube of small caliber. The wound was drained, partly closed, and the leg laid upon a posterior splint. For three months there was gradual and satisfactory progress and the wound was fully healed. Six months later, despite an apparent effort on the part of nature to reproduce the tibia, there was still an interval of about five inches between the upper and lower fragments, and progress in this direction seemed to be practically suspended. At this time the leg could not be extended upon the thigh, but hung loose, flail-like, and utterly useless. (This is shown in the small photograph, Fig. 1.)
On January 27, 1903, I finally determined to supply the

On January 27, 1903, I finally determined to supply the defect by sawing the fibula at a point opposite the lower end of the upper tibial fragment and attaching it thereto. This was done without difficulty, and the divided end of the fibula was firmly



Fr -Cond to on adm so

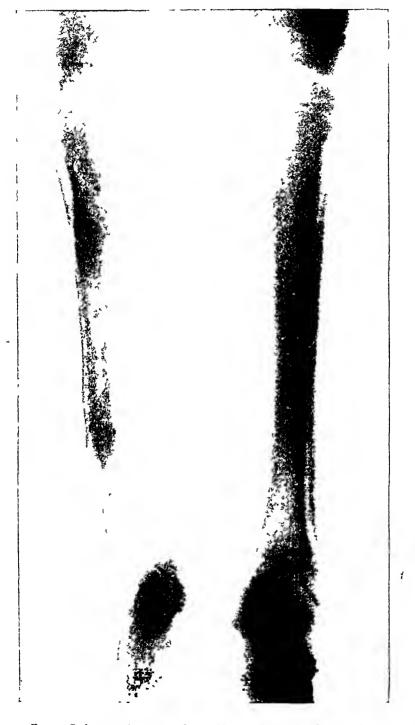


Fig. 2—Radiogram showing condition of bone eight months after operation

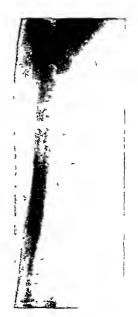
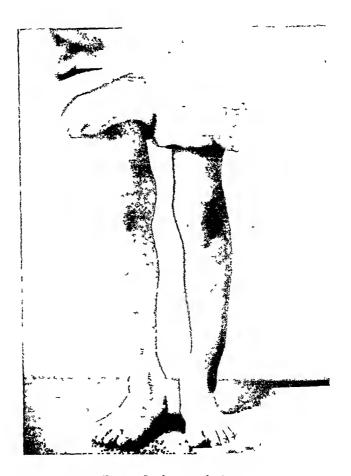


Fig 3.-Rad ogram show g cond to 1 rice so the after operat on



F1G, 4 -Condition on discharge

planted in a cup shaped depression in the tibia, as above described. At this time the diameter of the fibula was about that of an ordinary lead pencil, or approximately one third of the diameter of the normal tibia at a corresponding point. Union was tolerably slow, but solidification was finally noted six months later, July, 1903.

The following note was made September 20, 1903 "The lad walks with the limb eneased in two lateral splints as a support to the ankle-joint, there being a tendency for the foot to evert when the patient stands upon the affected member (The then condi-

tion is shown by the radiogram, Fig 2)

Not satisfied with the weight-bearing condition at that time, I concluded to transfer the lower end of the fibula to the lower fragment of the tibia, which was done October 6, 1903. At this time it was noted that, during the six months when the lad walked with slight foot eversion, there was effected a permanent change in the conformation of the tarsis, resulting in an outward align ment of the axis of the lower fragment of the tibia. It was impossible to correct this condition, and a noticeable deformity in the present contour of the limb finds its explanation in this fact. The operative wound healed kindly, and on February 15, 1904, perfect bony union was secured. (See radiocram, Fig. 3.)

perfect bony union was secured (See radiogram, Fig 3)
Since that time the patient has progressed admirably. The
limb, though three-quarters of an inch short, has assumed the
dimensions and in a general way the contour of the normal member (Fig 4) Careful measurement of the transferred portion of
the fibula shows that its diameter is now three quarters of an inch,
or practically the same as the opposite thia. The lad goes to
school, plays ball, and joins in the ordinary sports of other boys,
and, despite the lateral deformity and slight shortening, he walks
without support and with only the suggestion of a limp

In a similar case I should certainly insist upon the affected member being kept at rest until the second transposition could be effected, thereby avoiding the deformity, which is the only serious defect in this case. Considering the extensive destruction of the tibia which occurred prior to his admittance to my service, I can conceive of no other method which would have offered a result in any sense so satisfactory as the one adonted

CONTRECOUP FRACTURE OF THE STERNUM.1

BY GEORGE DE TARNOWSKY, M.D., of chicago.

CASE HISTORY.-Mr. P., aged forty-three years, on April 28, 1904, while cleaning car-windows, was thrown from the ladder on which he was standing. His fellow-workmen stated that he fell on his head and his body bent forward and "doubled up on itself." In other words, after striking the ground, his body completed a somersault, and he landed on his feet in a doubled-up condition. When called to see him a few minutes after the accident, I found him semidelirious, bleeding profusely from scalp wounds, and complaining during lucid intervals of pain in his chest. An extensive stellate scalp wound over the left parietal eminence made examination of the skull easy; no fracture or depression was noted, and the wounds were sutured. Examination of the thorax showed a distinct protuberance over the sternum at the level of the second and third chondrosternal articulations. Tenderness over this area was exquisite and slight crepitus was probably elicited once, but the great pain forbade confirmation of this symptom. There were no external discolorations, bruises, or marks such as would undoubtedly have been present had the patient's sternum struck any solid body in fall-The man was sent home and put to bed with hot moist dressings over the sternum. The scalp wounds healed per primam, and will not be further considered in this paper.

April 29. Patient bedridden; temperature, 101° F.; pulse, 104; respirations, 34. The midsternal region is discolored; the protuberance has increased and tenderness is still very acute. An attempt was made to keep patient's head and shoulders thrown back in order to reduce the deformity, but we had to desist on account of increased pain and discomfort. Adhesive strips over the fractured area were also tried, but promptly discontinued, as they only aggravated the pain. The patient coughs frequently, and on two occasions the sputum was tinged with blood. Respi-

Read before the North Shore Medical Society, December 6, 1904.

ratory movements are shallow and extremely painful, and cough is apparently agonizing. On auscultation, a number of large moist rales are heard over both sides of the chest anteriorly Percussion showed slight dulness over the anterior mediastinum above the fracture. The heart sounds are normal, except for a rather marked accentuation of the second aortic sound, which could be accounted for by the well marked arteriosclerosis.

April 30 Temperature, 100° F, pulse, 94, respiration, 32 Patient required opiates for pain Hot linseed poultices applied to sternum Cough persists, but pulmonary findings are negative, with the exception of a few fine moist rales over the right lung anteriorly The patient's general condition improved daily, and no further symptoms developed until May 5, on which date he was seized with cramp like pains in both upper extremities. He said he felt as though "somebody was gripping his arms tightly". These pains lasted from one to three minutes and reappeared several times daily for about a week. There was coincidently some pain on pressure over the fifth, sixth, and seventh cervical vertebræ, but no deformity could be made out, and there was at no time any external evidence of injury. There were no motor disturbances but the man complained for several days of numbness and tingling in both upper extremities By the end of the first week he was able to walk around the house The patient's attitude was very characteristic,-body bent forward, head slightly flexed to the left rapid shallow respiration and immobile thorax. The lungs cleared up satisfactorily, respirations gradually returned to their normal rate and quality as the pain decreased, and on May 19, when patient was discharged the findings were as follows At the level of the second costal cartilages, the sternum forms a distinct palpable ridge, the lower fragment overlapping the upper to a very slight extent. The talks is dense, there is no tenderness to pain and the driness over the anterior mediastrium has disappeared Palpation of the spinal column is negative, and there have been no sensory disturbances in the upper extremities for a week At present writing the patient's condition is satisfactory in every respect

Fractures of the sternum are extremely rare Malgaigne 1 saw one case in eleven years' service at the Hôtel Dieu in Paris, Lounsdale collected reports on two cases out of a total of 1901

fractures in the Middlesex Hospital service; Roland had two cases in five years' service in Guy's Hospital, London. Arbuthnot Lane stated that he had seen four cases of fracture of the sternum alone. Grant,² speaking of fractures of the sternum, said, "I have seen but one case, . . . and that occurred in connection with fracture of the spine." Of indirect or contrecoup fractures, Servier,³ in 1889, could only collect eighteen to twenty cases. In the literature at my disposal I have been able to add seven new cases since 1889. Of these, one was in all probability due to muscular action.

Fractures of the sternum may be due to (a) Direct, (b) Indirect violence, (c) Muscular action. The majority of cases are direct fractures, simple or compound, single or multiple, as a rule associated with other bony or visceral lesions; they differ in no respect from fractures of other bones, and will not be considered in this paper. The rare cases of fracture from muscular action are apparently caused by forcible backward flexion of the vertebral column with coincident tension of the recti and sternocleidomastoidei muscles, wrenching the sternum apart. Chaussier 4 reports two such cases occurring in young women during labor. They were both in a position of extreme opisthotonos when the accident occurred. Lucchetti and Posta,5 Comte and Martin,6 and David, Sabatier, and Roland quoted by Hamilton,7 all mention similar cases. Dubois 8 gives the history of a clown who, while doing the backspring, fractured his sternum. Irwin o reports the case of a coachman who, while seated on top of his omnibus, was dragged by his unruly team through a low doorway. His body was violently bent backward, resulting in a fracture of the sternum.

Contrecoup fractures and dislocations almost invariably occur at the junction of the manubrium and gladiolus. They are usually transverse, but may be oblique or T-shaped. In 85 per cent. of the cases analyzed, the gladiolus was found to override the manubrium; in 15 per cent., the reverse held true or there was fracture or dislocation without overriding. It is often impossible to differentiate dislocation from actual frac-

ture, the former cannot, of course, be present when bony union has occurred between the manubrum and gladiolus

Enology—Contrecoup fractures or dislocations of the sternum are produced in a variety of ways. A brief description of a few typical cases will help us to understand the mechanism of at least a majority of these lesions.

CASE I—Costa de Sarda. A male patient aged forty five years threw himself from a third story hospital ward landing on his buttocks. Three fractures of the aternum were found post mortem but no evidence of external murry over that hone.

CASE II - Velpeau n A middle aged man fell from a cart, landing on his back Fracture of the upper part of the sternum was diagnosed

CASE III —Lafont Man fifty eight years old fell backward from a cart landing on his back. A fracture of the sternium was found with the lower fragment overriding the tipper one. The patient also had a hama toma in the left axilla and died of septicamia. It was found post mortem that the fracture had occurred one centimetre above the articulation of the manubrium and eladiolise.

CASE IV—Rurington 14 An acrobat thirty years old while turning double forward somersaults fell ten feet on the back of his head which was thus foreibly flexed on the chest There was found a fracture of the intervertebral substance between the sixth and seventh cervical vertebræ and an oblique fracture of the upper sternum Rivington believed that the foreible flexion of the chin on the sterning caused the fracture

CASE V—Ibid Man aged thirty seven years While walking in the street a piece of scaffolding fell on his head crushing his hat and tearing the scalp from the skull. It was found that he had suffered a fracture of the sunious processes of the third and fourth dorsal vertebra, also a

forward dislocation of the gladiolus on the manubrium

CASE VI—Ibid A heavy bag of seed fell from a height of forty feet on a man s head striking him between the shoulders. The spinous processes of the six upper vertebre the six upper ribs on the left side and the sternum at the level of the second ribs were fractured.

CASE VII —Hodgen * A man aged thirty eight years fell a distance of twelve feet striking on his shoulders and back. The usual type of sternal fracture with fractures of the spinous processes of the sixth and seventh dorsal vertebre were found.

CASE VIII—Battersham " reported the case of a miner who was struck aeross the shoulders and occiput by a falling mass of coal which 'doubled him up head flexed on chest." A transverse fracture of the sternum was found at the junction of the manubruum and cladiolus.

CASE IX—Tuttle." A man thirty four years old dived in the surf from a wooden pillar six feet high striking (presumably) with his hands on the sandy bottom. The attending physicians thought he must have struck his head on the sand but as none could be found in his hair and there was no scalp injury, it was reasonable to suppose that the patient was in the characteristic diver's attitude at the time of the accident. On examination, a dislocation of the first and second portions of the sternum was found, together with a fracture one and three-fourths inches below the luxation.

Case X.—Moerlin 17 wrote a thesis based on two cases. One of them was a contrecoup fracture of the sternum produced by a fall from a wagon; the other was probably due to direct violence.

CASE XI.—Cale.¹⁸ A middle-aged man was thrown from his buggy and fell on the back of his head. Extensive scalp wounds were found with a fracture of the sternum.

Case XII.—Dubreuil.¹⁰ A mason fell from a scaffolding, striking the ground with his back. The sternum was found to be fractured in three places.

CASE XIII.—Watts.²⁰ A woman, fifty-eight years old, fell backward from a wagon, landing on her shoulders, and fractured her sternum.

Case XIV.—Stone and Cotton.²¹ While doing gymnasium work, a boy, twenty-one years old, fell with his chin flexed on the sternum, the brunt of the fall being received on the occiput and back of the neck. The gladiolus was found dislocated behind the manubrium.

CASE XV.—Van Horn.²² A man, sixty-three years old, fell from a tree a distance of twenty feet, landing on the back of his head and shoulders and forcibly bending his body forward. A fracture at the junction of the first and second pieces of the sternum was found; also a fracture of the fourth costal cartilage on the left side.

Case XVI.—Turner.²³ An elderly man was caught between a cross shaft and a descending elevator, his body and head forcibly flexed forward. Post-mortem a fracture of the sternum at the level of the second ribs was found, together with a laceration of the trachea and a hæmatoma at the anterior mediastinum.

We can now formulate the following propositions: (1) Contrecoup fractures of the sternum are produced in a majority of cases by falls on the head and shoulders. (2) The thorax is brought in forcible anteflexion, i.e., doubled up on itself. (3) The lesion is nearly always situated at the junction of the manubrium and gladiolus. (4) The gladiolus usually overrides the manubrium. (5) The nature of the lesion will depend on (a) whether bony union of the joint had taken place, (b) on the variety of joint present. Rivington's statistics (loc. cit.) show amphiarthrosis, 51 per cent.; diarthrosis, 32 per cent.; intermediate (incomplete separation of the two pieces), 11 per cent.; ossified only 6 per cent. The exact mechanism of these fractures is still an unsettled point. We shall briefly review the

most widely accepted theories and endeavor to evolve from them all a "working theory" which can be applied to a majority of these accidents

Maisonneuve 24 taught that contrecoup fractures of the sternum were produced by falls on the scapula. On striking the ground, the scapulæ encounter a resistance which is transmitted through the clavicles to the manubrium. At the same time, the compression of the body-weight caused by the fall is brought to bear on the gladiolus through the ribs and corresponding costal cartilages. This pressure on the gladiolus is all the more powerful if the vertebral column is brought in forcible anteflexion below the level of the manubrium, because flexion of the vertebra transmits to the gladiolus through the lower ribs a part of the shock incident to the fall. In other words, he believes that the clavicles form a solid buttress, and that in falls on the neck and shoulders they transmit the shock to the sternum from above, while the middle and lower ribs convey it from below

Arbuthnot Lanc 25 has shown by experiments on the cadaver that heavy blows on a padded shoulder will produce fracture of the sternum He claims, however, that in falls causing a frac ture of that bone, the force is transmitted, not from the clavicle to the sternum directly, but only through the first and second ribs The clavicle, he says, rests on the anterior extremity of the first rib, just outside its union with the cartilage Regarding the clavicle as a lever whose inner extremity is fixed by ligaments which connect it with the upper part of the manubrium. and so form the fulcrum, the short arm of the lever corresponds to the portion of clavicle between its inner extremity and the point where it crosses the first rib, its whole length forming the long arm If force be applied vertically to the outer extremity of the clavicle, the manubrium is acted on by two forces in different directions, but conspiring to wrench the upper piece of the sternum from the remainder of the bone The one force is the tension exerted on the upper part of the manubrium by the sternoclavicular ligaments, the other is a much greater force exerted on the manubrium by means of the first rib and cartilage, owing to the pressure exerted on it by

the clavicle. These two forces acting together tend to cause the manubrium to rotate around an anteroposterior axis. The essayist closed his remarks by saying, "I do not wish to convey the idea that I believe the sternum can only be broken by means of the clavicle and first rib, but that it is one means."

T. J. Tuttle (loc. cit.) explains contrecoup fractures of the sternum as follows: Fracture may be produced by falling upon the outstretched hands, the force being transmitted hence through the clavicles and first ribs to the upper portion of the sternum. The force thus expended on the manubrium is a downward (with reference to the body) and backward force, while that exerted upon the gladiolus by the momentum of the body and abdominal viscera through the diaphragm and lower ribs is an upward and forward one. These two forces acting at variance, a fracture or dislocation of the sternum is produced.

Helferich 26 thinks that in forcible anteflexion of the head, the chin presses against the upper edge of the manubrium. The sternum is then compressed in its longitudinal axis until it snaps. If such were the case, one would certainly expect to find some injury to the soft tissues of the chin; no mention is made of such a finding in any of the reported cases. Servier (loc. cit.) is of the opinion that all contrecoup fractures of the sternum are produced by falls on the neck and shoulders or by pressure on the vertebral column. His theory is that falls on the head, shoulders, or back all tend to force the ribs and costal cartilages forward and upward (the body lying on the horizontal plane), i.e., the ribs tend to meet in the median line. This fact he demonstrated satisfactorily on a manikin provided with flexed wires in lieu of ribs. In order to appreciate the accuracy of Servier's theory, we must consider fully the anatomic conditions confronting us. The thorax is an osseocartilaginous cage, conical in shape, being narrow above and broad below, flattened from before backward and longer behind than in front. Its posterior surface is formed by the twelve dorsal vertebræ and the posterior parts of the ribs. The anterior surface is slightly convex and inclined forward from

above downward, it is formed by the sternum and costal cartilages The lateral surfaces are formed by the ribs and intercostal spaces (Gray) The posterior part of the thoracic cav ity (se, the vertebral column) is much more mobile than the anterior or sternal portion. The ribs increase in length from the first to the seventh, and decrease in breadth and strength from above downward Their movements are along two axes of rotation, both tending to increase the anteroposterior diam eters of the thorax.27 The range of motion of the ribs in creases from above downward Movements of the costal cartilages are of necessity accompanied by an upward and forward movement of the sternum to which they are attached, this movement being greater at the lower than at the upper end of the latter bone Of the component parts of the sternum, the first piece or manubrium articulates with the clavicles, first pair and part of the second pair of ribs Union with the gladio lus rarely takes place except in old age (Gray, Quain, De bierre) The four segments of the gladiolus begin uniting at puberty from below upward, so that by the age of twenty five this portion of bone consists of one piece. The gladiolits and third to seventh pairs of ribs may therefore be said to act as a unit Quite early in life, the first costal cartilages ossify, be coming continuous with the manubrium, of which they now form a part The second costal cartilages are united to the manubrium in the upper two thirds of their articular surfaces by fibrillated cartilage, and lower down to the plate of fibrocar tilage between the manubruum and gladiolus The lower third of the articular surfaces of the second costal cartilages form an arthrodial articulation with the gladiolus This explains why the second pair of ribs remains connected with the manufrium in dislocations or fractures of the sternum (Lane, loc cit) Intrathoracic pressure, i e, pressure in the thoracic cavity out side of the air passages, is ordinarily negative, but becomes pos-tive during forced expiration, especially if there is some obstruction to the exit of air. Sudden blows on the thorax will tend to force air out, provided the glottis is not closed 28

Berning these anniomical facts in mind, we can follow

Servier's theory, which is briefly as follows: Falls on the head, shoulders, or back press the ribs forward and upward, the range of motion increasing from the first to the seventh pair. This upward motion is perforce transmitted to the sternum, which is thus caught between two forces acting in opposite directions. The weakest portion of the sternum gives way and a fracture or dislocation results. The manubrium, being solidly fixed by the short, strong, upper ribs, retains its position, whereas the gladiolus, articulating with longer, more motile ribs, is thrown upward and overrides the first bone.

Two supplemental forces should, in our opinion, be added to those already mentioned, namely, intrathoracic pressure and the action of the second pair of ribs and costal cartilage. (a) We have already mentioned the fact that intrathoracic pressure becomes positive during forced expiration, especially when there is obstruction to the exit of air from the lungs. This is precisely the condition present at the time of a fall. The person draws a sudden deep breath and closes the glottis. The shock of the fall tends to force air from the lungs, but the tense glottis prevents its immediate escape, and positive pressure is exerted against the thoracic wall. We can thus consider the thorax as a temporarily closed cavity and look upon fractures of the sternum as due in part, at least, to a "bursting" force, similar to that which is present in contrecoup fractures of the (b) The second pair of costal cartilages are united to the manubrium by fibrillated cartilage, but form an arthrodial articulation with the gladiolus. The forward and upward movement of the ribs in falls on the head or shoulders tends to wedge the second costal cartilages between the two portions of the sternum, producing a diastasis or fracture of the intervening cartilage.

SUMMARY OF FACTORS PRODUCING CONTRECOUP FRACTURES OF THE STERNUM.

(1) Falls on the head or shoulders press the ribs forward and upward, the range of motion increasing from the first to the seventh pair.

- 261
- (2) The clavicles may sometimes act as a lever and help to wrench the nanubrium from the gladiolus This is especially true in falls on the extended hands
- (3) Intrathoracic pressure at the time of the fall exerts a positive pressure on the thoracic wall
- (4) The second costal cartilages act as a wedge, tending to separate the manubrium from the gladiolus

Pathologic Anatomy -Rivington's statistics show that only in 6 per cent of all cases does there exist bony ankylosis of the manubrium and gladiolus A genuine fracture can therefore only occur in a comparatively small percentage of cases Rivington's "intermediate cases" (11 per cent) can be added to the genuine fractures as in them there is at least superficial ossification of the sutural cartilage. It is probable that in a small proportion of the specimens classed as amphiar throdial, there was some cartilaginous or fibrous union between the manubrium and gladiolus We must nevertheless conclude that a majority of the so called fractures of the sternum are in reality dislocations with or without rupture of the sutural car tilage Ashhurst 29 correctly said that dislocations were usually due to contrecoup or muscular action, whereas fractures were usually the result of direct violence He, however, incorrectly advises us to infer dislocation and absence of fracture when the gladiolus overrides the manubrium. The anterior sternal ligament is torn whenever the lower fragment overrides the upper one The posterior ligament is partly detached but re mains intact The second pair of ribs remains with the manu brium Union may be bony or fibrous Arbuthnot Lane (loc cit) has seen several cases of ununited fracture of the sternum in the dissecting room

Diagnosts—Hamilton (loc cit) wisely states that 'the frequent occurrence of congenital malformations of the sternum should warn us to exercise great care in our examinations, lest we mistake these natural irregularities for fractures." The same writer includes fractures and dislocations of the sternum in all of his remarks, as he very properly asserts that a differential diagnosis between these two conditions is usually impos-

sible. The classical symptoms of fracture or dislocation of the sternum are: (1) Severe pain at the junction of the manubrium and gladiolus; this pain increases during inspiration, coughing, or attempting to move the head in any direction. (2) The patient's attitude is rather characteristic. He stands or sits with head bent forward and usually to one side; respirations are short and shallow, and movements of the head or thorax are slow and cautious. A severe case of torticollis would give the same picture. (3) On inspection, a rather sharp bulging is seen just above the level of the second costal cartilage. (4) Palpation may or may not elicit crepitus; the gladiolus overrides the manubrium in 85 per cent. of all cases. Malgaigne (loc. cit.) states that with flexion of the head and overriding of the fragments one can diagnose a fracture due to forward flexion of the thorax; absence of overriding or diastasis of the sternum indicate fracture due to backward flexion of the thorax. (5) Percussion is negative unless a hæmatoma of the anterior mediastinum has formed, in which case we may find impaired resonance over the upper retrosternal region. We have found no cases of compound fracture due to contrecoup.

Prognosis.—The majority of cases make a very satisfactory recovery, regardless of the form of treatment instituted. Fatal issues are all due to associated injuries or complications following the injury. Fracture of the trachea, hæmatoma, emphysema, bronchitis, and fatal shock have occurred in these cases. In uncomplicated fractures, the fragments unite rapidly (three to four weeks), but the fracture is not solid for eight weeks. Union by overlapping is the rule, but function is restored.

Treatment.—The severe pain may require opiates during the first forty-eight hours. The patient should be kept in his room, well protected from sudden chilling of the body, as bronchial affections are to be avoided on account of the extremely painful coughing which they induce. Hot applications in the form of poultices or plastic dressings are very grateful to the patient. When lying down, a small, hard pillow should be placed between the scapulæ, and the head should be low.

Actual reduction of the displacement may be easy or impos sible, and once reduced, the fragments tend to spring back to their former malposition Stone and Cotton (loc cit) reduced a fracture in the following manner The patient was placed so that the angles of the scapulæ rested on the end of the operating table, while an assistant lay across him and fixed the legs and pelvis. The spine was then strongly extended by traction downward, applied to the chin and occiput, and the arms were brought upward and outward, the patient resisting the outward rotation He was then directed to cough and the fragments readily slipped back. The object of the outward rotation of the arms was to give more direct traction, through the tense pectorals, on the upper rib insertion of the muscles and so, indirectly, on the manubrium Plaster of Paris jackets were satisfactorily used by Cale and Hodgen A pad on the lower frag ment, with figure of eight bandage to keep the shoulders pulled backward, may be sufficient A Taylor steel back brace with apron and head support may be necessary in order to immobilize the fragments. Operative treatment is only indicated in the presence of alarming pressure symptoms as evidenced by cynaosis and dyspinea, or when an abscess of the anterior mediastinum has occurred A median incision over the upper sternum is made, and reduction accomplished by means of hooks or tenaculæ A gamlet may be used to elevate the fragment Trephining the stermin has been resorted to when drainage is required Ligation of the internal mammary artery has been necessary While the sternum is broken less often than any other bone (1 per cent of all fractures, accord ing to Hoffa), we would conclude this paper by advising a routine examination of the anterior thoracic wall after all falls on the head, shoulders, extended arms, or pelvis

REFERENCES

^{&#}x27;Malgaigne. Diet Encyclopedique des Sciences Med. Vol. vii Grant. International Climics July, 1899 p 69

Servier Gazz Heb de Med et Chur 1889 p 155 Chaussier Reque de Medieine 1827

Lucchetti and Posta. Boll delle Sc. Med. di Bologna 1857

- ⁶ Comte and Martin. Bull. Soc. Anat., Paris, 1826.
- ⁷ Hamilton. Text-Book on Fractures.
- Dubos. Thèse de Paris, 1835.
- ° Irwin. Medical News, June 23, 1888.
- 10 Costa de Sarda. Gazz. des Hôp., Paris, 1853, p. 413.
- ¹¹ Velpeau. Gazz. des Hôp., Paris, 1864, p. 221.
- ¹² Lafont. Bull. Soc. Anat., Paris, 1867, p. 327.
- ¹² Rivington. Medico-Chirurgical Transactions, 1874, p. 101.
- "Hodgen. Medical Record, New York, 1877, p. 805.
- ¹⁵ Battersham. Lancet, 1884, p. 425.
- ¹⁶ Tuttle. Medical Record, New York, 1885.
- ¹⁷ Moerlin. Jahresbericht der Med., 1887, p. 412.
- ¹⁸ Cale. International Journal of Surgery, 1890, p. 173.
- ¹⁹ Dubreuil. Gazz. des Hôp., Paris, 1891, p. 651.
- 20 Watts. St. Louis Clinique, 1892, p. 263.
- ²¹ Stone and Cotton. Boston Medical and Surgical Journal, 1897, p. 313.
- ²² Van Horn. University Medical Magazine, 1897, p. 726.
- Turner. Lancet, November 5, 1898.
- ²⁴ Maisonneuve. Archives Gén de Méd., 1842, p. 249.
- ²⁵ Arbuthnot Lane. Transactions of Pathological Society, London, 1884-85.
- 25 Helferich. Text-Book on Fractures.
- * Halliburton. Kirke's Physiology.
- ²⁸ Hall. Text-Book on Physiology.
- ²⁰ Ashhurst. Medical and Surgical Reporter, 1881, p. 484.

FRACTURE OF THE CARPAL SCAPHOID, WITH HABITUAL DISLOCATION OF THE CENTRAL FRAGMENT

BY RAYMOND RUSS, MD,

OF SAN FRANCISCO

STIMSON (ANNALS OF SURGERY, Vol XXXV, page 574) has reported two cases of scaphord fracture with dislocation of one of the fragments, and has collected from the literature three similar cases. The following is especially interesting, as it is to my knowledge the first case of habitual dislocation to be reported.

E D, laborer, aged thirty-two years, presented himself at my service in the Dispensary Clinic of the University of Cali forma, department under Professor Harry M Sherman, on November 1, 1904, for a forward metacarpophalangeal dislocation of the little finger, right hand While the finger was being dressed the patient called my attention to his left wrist, which he said had been injured three years before. On the anterior surface of this wrist and directly over the scaphoid carpal was a small bony pronumence about the size of a pea. This could be reduced with slight force when the hand was flexed upon the wrist, but remained dislocated in all other positions in which the hand was placed.

A radiograph showed a transverse fracture of the carpal scaphoid, the dislocated bone being the small fragment adjoining the os magnium and semilinar. The patient could dislocate the fragment easily, effecting this several times for me by grasping tightly the edge of the operating-table. He stated that the dislocation frequently occurred when he worked with pick and shovel, but he had always been able to reduce it readily. The left liand was as strong as the other, and all the movements of the hand and wrist were normal. The patient complained only of a slight grinding in the wrist at times, but said that it was never accompanied by pain

On inquiry, he stated that the injury had been caused by a fall three years before while attempting to board a moving street-car. He was in a drunken condition at the time, but remembered having grasped the car-rail with his left hand and having been thrown forcibly to the pavement. He could give no further details of the accident. The wrist was greatly swollen for a period of three months following the injury, during which time he received no surgical attendance. Full function returned in about one year's time.

INTERSCAPILLOTHORACIC AMPUTATION.

REPORT OF OPERATION FOR SARCOMA OF THE HUMERUS

BY FARRAR COBB, MD, of BOSTON, MASS,

Surgeon to Out Patients at the Massachusetts General Hosp tal

THE following case is interesting because of the great rapidity of the growth of the disease, the associated pain, the technique of the operation, and the complete absence of surgical shock, the successful immediate result and the disappointing ultimate result, certain pathological conditions in the specimen, and the excellent X-ray plates of the tumor

The patient was a young adult, a member of the fire department in Wakefield, Massachusetts, with an unimportant family listory and an entirely negative previous personal history. It is noteworthy that only eight weeks before the operation did this more than ordinarily intelligent man notice anything wrong with list arm. At that time his arm began to feel weak, and he could not raise the elbow from the side without pain in the shoulder. He thought there was "crackling" in the joint when he first began to notice the weakness and pain. He was treated for two weeks by a Wakefield physician and then came to the Out Patient Department of the Massachusetts General Hospital, where a diagnosis of muscular rheumatism, or bursits was made, and massage and hot and cold douching ordered without any relief. Four weeks before operation, enlargement of the shoulder was first noticed by him.

The patient entered the South Surgical Service of the Massachusetts General Hospital on October 23 1903 Through the kindness of Dr Beach, the senior surgeon of the service, the writer, his assistant surgeon, was allowed to take charge of the case and to operate

Upon examination, the patient was found to be a well-developed and nourished young man, apparently in perfect general physical condition. There was a distinct tumor mass at the point of the left shoulder, evidently arising from the humerus, some-

what tender, about as large as a man's fist, and somewhat fusiform in shape with undefined margins. There was almost complete loss of motion in the shoulder-joint, no glands could be palpated in the axilla. The pain from the growth was undeniably severe at all times. An X-ray photograph (Fig. 1), in fact more than one, was taken, and, although the plates showed almost beyond question a periosteal sarcoma of the humerus, the fact that the only operation to be considered was the very severe one involving the removal of the entire upper extremity, made an exploratory incision, to obtain a piece of the growth for microscopic examination, seem wise. All the surgeons who saw this case in consultation agreed in advising this; the patient himself refused operation until this proof was shown him. On the 28th of October, under ether anæsthesia, an incision three inches long over the tumor mass, parallel to the fibres of the deltoid muscle, was made, and it was found that the muscle was involved in the growth. Microscopic examination of the pieces of tissue removed showed undoubted giant-celled sarcoma.

A sharp reaction in temperature and pulse followed this diagnostic incision. The patient's temperature rose to 103° F. forty-eight hours after the operation, and his pulse to 120, and there was greatly increased pain in the shoulder, which extended down the arm into the hand. The increase in pain was very marked; for three days the patient was in great distress and looked very sick, after which the temperature and pulse came down to approximately normal, and the pain diminished to what it had been previous to the exploratory incision. There was no evidence of septic infection in the incision at this time or afterwards to account for the reaction. The wound healed by first intention. It was a matter of interest and speculation as to whether the reaction was not due to forcing into the circulation chemical products of the sarcomatous tissue, and possibly sarcomatous cells. The importance of not cutting directly into a malignant growth, and that in operations for the removal of carcinoma and sarcoma all cutting instruments should be kept away from the diseased areas to avoid metastasis directly caused by the surgeon himself, has long been recognized theoretically. In this case the exploratory incision could have, and possibly may have, caused metastasis and recurrence. This point will be taken up later when the pathological conditions found in the specimen



Fig. 1 -Skiagraph taken before operat on

t/a			

are considered A diagnostic incision, however, seemed justifiable and was demanded

Removal of the arm with the scapula and the outer two-thirds of the clavicle, interscapulothoracic amputation, was done under ether anæsthesia on November 5

The important points in this operation are, the control of the hæmorrhage and the prevention of shock from dividing the great nerve trunks Death from this operation will usually be due to shock, with or without hamorrhage It was shown in this case that shock could be prevented entirely by controlling hæmorrhage, so that practically no blood was lost, and by adopting the method of Crile and Cushing, of injecting a weak solution of cocaine into the large nerve-trunks of the brachial plexus before dividing them It is known that one of the great factors in causing shock from surgical operations is the division of the great nerve trunks, the brachial plexus, the sciatic and anterior crural nerves Crile * has shown by his experiments and practical work, that if, before dividing the nerves a few drops of a weak cocaine solution are injected directly into each nerve trunk, the division of the nerves has no perceptible effect on the pulse rate or volume. In this same connection Crile has shown that in operations upon the larynx painting the internal surface of the larynx with a solution of cocaine will prevent those unfortunate cases of fatal failure of respiration due to in terference with the recurrent larvingeal nerve fibres

Cushing (Annals of Surgery, 1902, Vol xxxvi, page 321) has written at length on prevention of shock in major amputations by the use of this method, and reported two cases of interscapilothoracic amputation in which he had used it with apparent success. The writer has had little experience with this use of cocaine aside from this case, it has been used twice by him in amputations of the thigh in cases in which moderate shock was present before the operation. In both cases the amount of shock was not added to by the operation. Lind

^{*} Problems relating to Surgical Operations Philadelphia 1891

(Boston Medical and Surgical Journal, April 16, 1903) has reported a case of this form of amputation for sarcoma of the humerus in which he followed out this method of Crile's, and in his opinion it was very effective. A careful search of the surgical records at the Massachusetts General Hospital shows that since 1870 this operation has been performed in but four cases in addition to the case described by the writer. In none of the cases is it recorded that this method was adopted. In one case of the four there is no mention in the records of shock; in the other three cases shock was profound. In one case, which died within a few hours after the operation, it may be assumed with fairness that the amount of hæmorrhage, because of the failure to secure the subclavian vessels, was sufficient to have caused the shock; in another case the patient was in very bad general condition from prolonged suppuration. The fourth case was apparently a very favorable one for operation; the hæmorrhage was well controlled, and there was apparently no reason for the condition of extreme shock which supervened towards the end of the operation requiring much stimulation and oxygen, except for the division of the nerve-trunks. It is noteworthy that in this case the trunks of the brachial plexus were cut twice; that is to say, after dividing the nerves the first time it seemed wise to the surgeon to cut them off again higher up.

The difficult part of this operation, and the part which took the longest time, was the ligating of the subclavian artery and vein preliminary to removing the extremity. It was made easier because the subject was not large and fat, nor was there any infiltration of the supraclavicular region with disease, so that the dissection was through normal tissues at this point. The method of cutting through the clavicle, leaving the inner third, was chosen because no reason was seen for adopting the more dangerous method of disarticulating the clavicle at the sternal joint. The middle third of the clavicle was divided subperiosteally, the underlying periosteum and subclavius muscle divided and pulled aside, and the subclavian vessels disclosed by careful dissection. It was found that much care was necessary in dissecting down upon the artery, which was covered by



F G 2-Pho ograph of the pat ent taken e ght days af e opera on

•		

the subclavian and many smaller vems. The artery was ligated first with two strong silk ligatures and was divided between the ligatures, after which a third ligature was applied to the prox imal end for increased safety. The arm was then elevated to empty it of blood, and then the vein was tied and divided. After ligating the vessels, the formation of the skin flaps and the divi sion of the muscles were comparatively easy The anterior and posterior skin incisions were joined at the root of the neck and at the bottom of the axilla The pectoral muscles were rapidly divided, the trunks of the brachial plexus were injected with cocame (Schleich's solution), and divided with scissors, after which the muscles attaching the scapula to the trunk were cut as quickly as possible The suprascapular and posterior scapiilar vessels, the only blood vessels of any importance to look out for after the subclavian had been secured, were readily seen and clamped The skin flaps came together easily, were sewed with interrupted silkworm-gut stitches, and a small rubber tissue drain was placed in the lowest angle of the incision

The patient was under ether one hour and fifteen minutes, thirty five minutes of this time was consumed in the resection of the clavicle and ligation of the vessels There was no shock whatever from this operation, the pulse remained at 80 through out and did not change in volume at any time. The evening of the day after the operation the temperature rose to 100° F, but became normal the next day. The rubber tissue drain was removed in forty eight hours The patient made a complete and uneventful recovery, and on the fifth day was up walking about the ward (Fig 2) The pathological report on the specimen was made by Dr W F Whitney, and is as follows "The left arm with scapula and clavicle removed together At the upper part of the humerus, just below the head, was a new growth about eight centimetres in greatest extent, three centimetres in thickness, of a fusiform character, embracing the shaft and almost encircling it Upon section it was grayish, homogeneous, with marked calcification and erosion of the cortical portion of the bone, and apparent extension into the medullary cavity but without any destruction of the cortex The circumflex vein was filled with a thrombus composed of new growth, which extended

as far as its union with the axillary vein, into which it slightly projected. A number of other small veins in the immediate vicinity were also thrombosed. There were numerous large, soft, axillary lymph nodes. Microscopic examination of the growth showed it to be composed of large round cells of irregular shape and size, mixed with many multinucleated ones. In places the tissue was extensively calcified. Giant-cell sarcoma of periosteal origin with extension into the veins. The lymph nodes showed simple hypertrophy, especially of the endothelial elements."

Before the operation, it was thought that this was a specially favorable case, inasmuch as the limited duration of the growth and its confinement to the humerus and deltoid muscle fostered the hope that recurrence would be long delayed; after finding the sarcomatous thrombi in the veins, however, an early return was feared. Eight months later the patient entered the medical wards of the hospital suffering from pleurisy with bloody fluid, beyond a doubt of malignant origin. The history as given in the medical records is as follows:

- "May 31, 1904, Re-entry. P. I. Three months ago first had pain in the back; this disappeared but three weeks ago; he began to have a cough with white and at times bloody sputum, and severe pain in lower right chest. Pain worse on deep breathing and on coughing. Tapped three days ago and three and one-half quarts of bloody fluid removed, after which cough and pain became worse. Appetite poor, sleeps well, bowels constiputed. Has lost but little strength, chief complaint is pain in chest.
- "P. E. Well developed and fairly well nourished. Pupils' equal and react. Tongue moist, heavy white coat. Teeth.—Upper false, remainder in fair condition. Pharynx somewhat injected. Glands palpable in right axilla. Amputation of left arm and shoulder with an irregular seven-inch scar. Heart.—Impulse and dulness correspond in fourth space half-inch outside nipple line. Right border half-inch to right of sternum. Action regular, sounds of good quality. No murmurs. Systolic thrill palpable at apex. Pulse regular, of good volume and tension, artery not palpable. Lungs.—Dulness, becoming flatness, with diminished vocal and tactile fremitus and breathing as high as the sixth rib



Fig 3—Peture I the specine made soon a et he ampuiat. Note ere inn of the new growth to the scap a the great bood exels in I telta la levus no ethe sarconatous throubly the sub-upul ren



Fig. 4.—X-ray photograph of the specimen; the humerus has been sawed vertically; note the different stages of the periosteal growth, also the invasion of the cortical substance.

front and back on the right with friction rubs and coarse rales above Abdomen full, muscles held somewhat rigidly, tympantic throughout except in epigastrium and right hypochondrium, where there is dulness, no masses or tenderness. Liver dulness upper border not made out, lower border one and one half inches below costal margin in nipple line. Spleen not palpable. Reflexes present and normal. External genitals normal. No ocdema. Temperature, 99.6° F. pulse, 112, respiration. 28

Hb → So per cent. Whites 19 500 Unne-n-ac-ros8-alb=0 (Sed Few fat cells Occ squamous and cl-n U-3 28 per cent b s d == 0) large round cells

"June 1 This AM complained of pain in left chest, on evamination a marked friction rub was felt and heard in lower left chest in the side

"June 5 Fluid in right chest is diminishing friction rub in left side is nearly gone, and signs of fluid are disappearing Feels and looks better

"June 8 Friction rub disappeared Feeling better every day

"June 12 Right chest tapped this morning twice but no blood or fluid obtained General condition unchanged

"June 15 Two days ago developed a dry pleurisy in cardiac region, very painful. No rise in respiration or temperature To day it has nearly disappeared and patient feels very well

Hb −80 per cent, Whites 9400

'June 19 Anxious to go home No more pleuris) or pain in chest Discharged much reheved

It is noteworthy that in spite of the widespread pleural in volument as evidenced by varying areas of pain friction rubs and abundant hemorrhagic exudate, the patient improved greatly while in the hospital, and left comparatively free from pain and with no fluid in the chest. He was seen by the writer at this time and was in good flesh, looking about as well as when he was operated upon. For over six months after the operation he stated that he had been, in his opinion, perfectly well and entirely free from pain.

The patient died from recurrence of the pleurisy and sus

picious cerebral symptoms early in July, 1904, nine months after the operation.

It is disappointing to the surgeon to have in an apparently favorable case such a rapid recurrence with fatal termination. Such an outcome emphasizes the fact that no prognosis in regard to sarcoma can be made. Unfortunately, in the majority of cases operated upon, the disease recurs within twelve months, not locally for the most part, but in some more or less remote region. For seven months the young man was free from pain and mental worry, and was to all intents and purposes well; whereas, before the operation his suffering was very great both in mind and body, and the progress of the growth was rapid; this is sufficient justification for the operation.

Attention is again called to the malignant thrombi that were found in the circumflex and subscapular veins upon examination of the specimen; these can be seen in the illustration of the specimen. (Fig. 3.) At the time it was suspected that the presence of these thrombi meant that it was possible and probable that metastasis had already taken place into the venous system beyond, and, as was suggested above, it is not unsound reasoning to assume that the exploratory incision for diagnosis caused their formation.

The operation of interscapulothoracic amputation is considered to be one of the most radical of procedures. It should be the method adopted in most cases of malignant disease of the humerus, especially when the disease involves the tissues of the shoulder over the head of the bone. It may have to be done occasionally for malignant disease of the axilla, when the axillary vessels cannot be ligated without destroying the vitality of the upper arm; very rarely a surgeon will be called upon to perform this amputation in extensive injuries of the upper arm and scapula. Lund, of Boston, has had one traumatic case, which, however, did not survive the operation. It is rare that cases subjected to such severe traumatism are in sufficiently good condition to stand this operation.

Statistics cannot furnish an accurate estimate of the mortality of this operation when done for malignant disease of the

humerus The character and size of the growth, the age and resistance of the patient, and the method of operating are factors which vary within wide limits. If the patient is in sound physical condition in other respects, and the growth is limited to the shoulder, with little infiltration into the tissues at the base of the neck, and if in the operation proper technical attention is given to the control of the hæmorrhage and prevention of shock, as described above, it is rational to feel that in the great majority of cases this operation can be done with safety, probably with just as much safety as amputation of the upper extremity at the shoulder joint.

The control of the hæmorrhage is an all important factor in this operation. The method which most speedily and safely exposes the third portion of the subclavian artery and vein al ways should be adopted. The operation as outlined by the writer is essentially the operation described by Berger (L'Am putation du Membre superieur, etc., Paris, 1887) It is possible to enumerate as many as eight or nine different methods of controlling the hæmorrhage, as has been done by Le Conte (Annals of Surgery, 1899 Vol xxx, page 260), several of them depending upon compression of the subclavian vessels with or without resection of the clavicle. Most of these are un certain and unsafe. There are only three surgical ways to efficiently control the hæmorrhage and of these three ways one. in the vast majority of cases always is to be preferred artery and vein may be ligated without preliminary resection of the clavicle, after subperiosteal resection of the middle portion, or after disarticulation of the clavicle from the sternum, with removal of the entire bone. Le Conte has written at some length advocating the removal of the whole clavicle previous to securing the blood vessels. His reasons for this are that it is needed to give the best exposure, and decreases the accidents of ligation He thinks the method is quicker and easier than The writer can see no reason for choosing this method, except in those exceptionally rare cases of large tumors with extensive encroachment upon the tissues at the base of the neck, in which it is doubtful whether by resecting the middle

third of the clavicle enough room can be obtained to safely expose the vessels, or in cases in which the clavicle is so involved in the disease that it may be more surgical to remove the whole bone. Whenever malignant disease has so extensively involved the tissues at the base of the neck and the bony substance of the clavicle as to require excision of the whole clavicle, it may be questioned with good reason whether any operation is advisable. Disarticulation of the clavicle at the sternal end must invariably be a more dangerous procedure than resection at the junction of the inner and middle thirds. The risk of wounding the innominate vein or the pleura is considerable; the attachments of the sternomastoid muscle will be weakened, and the deep fascia of the neck opened in all probability. In the writer's opinion, the method of choice in all cases in which operation is advisable is the subperiosteal resection of the middle third of the clavicle preliminary to ligation of the vessels and the ligation of the subclavian artery in its third portion before ligating the vein. This method will give room enough. In large, heavily muscled and fat individuals it may be necessary to divide transversely some fibres of the pectoral muscles. Lund, in his article referred to above, reports that this procedure was adopted by him with great advantage. If this is done, there cannot fail to be room enough for a safe and fairly rapid dissection, if the case is at all an operable one.

Among the cases at the Massachusetts General Hospital there has been found one case of advanced malignant disease, with a duration of many months, in which the extension to the soft parts of the base of the neck was marked. This case was operated upon; but upon resection of the middle third of the clavicle the surgeon was unable to find the subclavian artery, or to feel its pulsation, thereupon he adopted the method of making a posterior incision, turning up and forward the scapula and arm and clamping the axillary artery and vein at the very last of the operation under the anterior flap; this patient survived the operation but a few hours. In this case it may be questioned whether resection of the whole clavicle was not indicated; and it is in such cases as this, in the opinion of

the writer, provided operation is attempted at all, that disarticulation of the clavicle is necessary

In one of the hospital cases, ligation of the subclavian vessels was done before resection of the clavicle, in the rest of the cases resection of the middle third was the method of choice. There is nothing to recommend the method of ligation of the subclavian vessels before resection of the bone. The field in which dissection is done is limited, after removal of the middle third of the bone, it must be easier and safer and can be done

much more rapidly

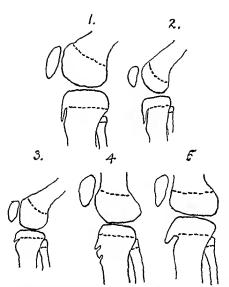
SYMMETRICAL INFLAMMATION OF THE EPI-PHYSEAL BEAK OF THE TIBIA.

BY KENELM WINSLOW, M.D.,

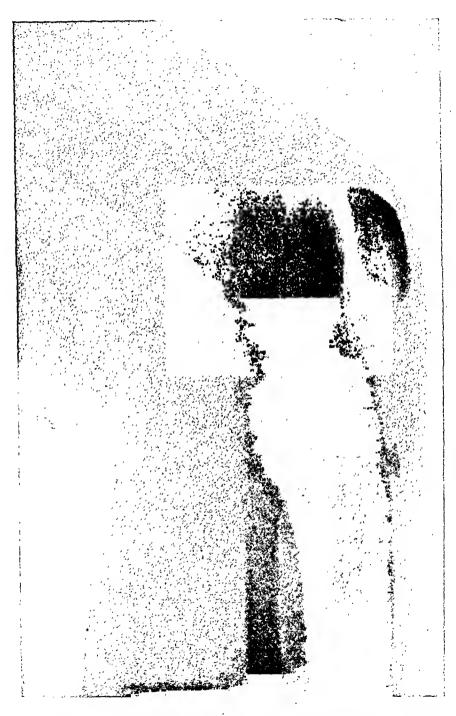
OF SEATTLE, WASHINGTON.

THE use of the X-ray has given us a much more complete knowledge of the nature and appearance of bones during the period of ossification, and in no instance has it proved of more practical interest than in the study of the development of the upper tibial epiphysis. Dr. Joseph C. Bloodgood, of Johns Hopkins, was one of the first to call attention to this subject in reporting the work of Schlatter (Beiträge zur klinischen Chirurgie, 1903, Band xxxviii, p. 887) in the December number of Progressive Medicine, 1903, and through his kindness I have been able to read Schlatter's original article. In the development of the upper tibial epiphysis there are two separate centres of ossification for the production of the tubercle of the tibia. One centre is formed at the site of the lower portion of the tubercle (Plate I and Fig. 4), and the other centre develops as a peculiar beak-like process which projects downward from the upper epiphysis. This beak is separated from the lower centre of ossification of the tubercle by cartilage up to the eighteenth to twentieth year, when the two centres become merged into one bony tubercle as it is seen in adult life. The lower centre of ossification of the tubercle does not appear until the twelfth year, and in Plate I, which was taken for the writer, of a healthy boy's tibia of twelve and onehalf years, this lower centre is conspicuously evident.

Ludloff (*Ibid.*, p. 65) has also made a study of the development of the tibial epiphysis and the beak-shaped process, which will be discussed by Bloodgood in *Progressive Medicine* for December, 1904. Figs. I and 2 show normal tibiæ at the age of twelve, with the beak-like process of the upper tibial epiphysis; while in Figs. 3 and 4 are shown two centres of ossi-



FIGS. 1-4, showing outline in profile of knee points from skingrams. Fig. 1 fafter Schalter), normal appearance of upper thola epophysis and the same is seen in Fig. as fall building and the same is seen in Fig. as fall building as the land of the same is seen in Fig. as fall building as the process and the lower-center of consideration for the turbelend of the falls in a health solve fig. as given an outline of both centres of ossification somewhat different but normal. Fig. 5 (later Schilter) fillstrater distinction of the beak like upper centre of ossification forward with separation of the cartilage between the two centres and enlargement of the beak from callons formation thosy of thirteen.



Normal boy of twelve and one-half years; shows epiphyses and notably the lower centre of ossification of the tubercle. The beak-shaped upper centre of ossification for the tubercle is but faintly discernible.

fication of the tubercle, the upper beak-shaped process, and the lower centre of ossification projecting beneath it

Schlatter's article refers to twelve cases following local in jury to the kinee joints. In them pain, swelling, and tenderness over the head of the tibia were predominant, and not infrequently persisted for months, and even for two years, in one instance, and such cases are likely to be mistaken for traumatic arthritis in recent injuries, or for pyogenic or tuberculous osteomy elitis or new growth in more chronic conditions. X-ray examinations proved that Schlatter's cases resulted from dislocation of the centres of ossification of the tibial tubercle (Fig. 5), and when seen early, rest in bed, with fixation of the limb for two or three weeks, was usually sufficient to give relief from the trouble.

Schlatter found that in cases of long standing, while the disappearance of symptoms following this treatment was gen erally considerably delayed, yet it was safe to assure the patient of an ultimate favorable termination

The foregoing premise is requisite to an understanding of the case herein reported, which seemingly simulates closely Schlatter's cases, although apparently differing from them in some minor respects

May, 1904 Patient, a boy of fourteen years with the following listory Family history good Personal history irrelevant, except for scarlet fever in infancy. Two and one half years ago he was attacked suddenly with fever, sore throat and developed a rash upon the chest which was visible for but a few hours. Immediately after this there were pain and swelling in the joints, and weakness and irregularity in the heart's action, palpitation and dyspicea and a mitral mirmur which persisted for nearly two years. The medical attendant at this time regarded the case as one of scarlet fever, but from the description and subsequent course of events, and the previous history of scarlet fever, it would seem as if a diagnosis of acute rheumatism might have been not improbable.

However this may have been, the boy was brought to me at the above date for trouble about the knees which did not commonly cause pain, but the knees were said to frequently "give way" and were very "sore." At this time there had been no pain or swelling in the joints for a considerable period, perhaps a year or more, and the heart difficulty had greatly improved.

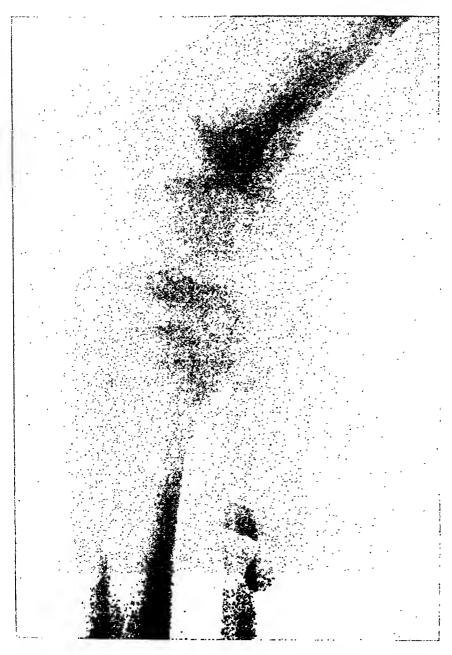
The boy was thin but healthy looking, tall, and growing rapidly. Careful physical examination revealed nothing abnormal in the chest or abdomen except a movable kidney, from which his mother is a sufferer. The heart was apparently normal in size and position, and its sounds were clear, strong, and regular. On the anterior aspect of the upper epiphysis of each tibia there was a protuberance which, when seen from the side, bulged forward almost as far as the knee-pan above, and, although reaching up close to the lower border of the knee-joint, it did not invade the joint nor was the joint in any way affected.

These swellings or tumors were very tender, somewhat abnormally warm to the touch, and of bony hardness, but the skin was not reddened. They gave no pain during motion or rest, unless the joint was violently jarred, or acutely flexed so as to bring great tension to bear upon the ligamentum patellæ which was attached to the inflamed area. The general bodily temperature was invariably found normal. The duration of the swellings was a matter of doubt; they were not present when I examined the boy some months previous.

The two swellings were nearly identical one with the other. No history of traumatism could be discovered, but is it possible to eliminate traumatism in a boy? An X-ray examination revealed an erosion of the beak-like process of the upper tibial epiphysis of both legs, suggesting a rarefying osteitis associated with an ossifying periostitis (Plates II and III). In endeavoring to form a differential diagnosis, the following conditions were considered: an infectious or tuberculous osteitis or osteomyelitis, new growths, and traumatic inflammation of bone. Dr. Bloodgood, who was consulted by mail, brought to my notice Schlatter's cases and, to solve the diagnosis, advised operation. The absence of fever was unfavorable to the diagnosis of either infectious or tuberculous disease, and the existence of new growth was rendered unlikely on account of the bilateral character of the swellings. The use of tuberculin was considered, but was thought inadvisable as operation seemed indicated, and this, it was believed, would clear away the difficulties in diagnosis.



Outline of right knee-jo it of case reported d as gie o on of the epiph seal beak and of paris j at benea h



View of left knee-joint of case reported above. Erosion of epiphyseal beak of tibia, but not so clearly defined as in Plate II.

Rheumatoid arthritis was suggested, but the existing affection was clearly a bone disease, and did not at any time involve the joints

After rest in bed, with fixation of the limbs on splints had been tried for a month, together with various other measures, as external applications of heat and cold, counterpritants, actual cautery, etc., without avail, the boy came to operation July 9, 1904 At operation there was found an area of softened, spongy, and much infected bone, perhaps as large as a silver quarter dollar, covered with greatly thickened periosteum under the seat of each external protuberance at the head of the tibia. The softened diseased bone was scraped away to a depth of perhaps one-third of an inch and the periosteum and skin were approximated without drainage There was no suggestion of any suppurative process The wounds healed well without infection Cultures taken from the scrapings proved sterile, and an emulsion of the same injected several times intraperitoneally into a rabbit gave a negative result The scrapings did not afford suitable material for sectioning. The net result of the operation, therefore, was disappointing from a purely scientific stand point in not elucidating the etiology of the inflammatory process

Practically, however, the operation was a decided success After the lapse of three weeks the patient began to go about, and a few weeks later there was a subsidence of tenderness and swell ing, and the patient is now well. I am unfortunately unable to present a skiagram taken since recovery

Some concluding remarks may not be amiss concerning this comparatively unusual condition. Apart from its injuries or diseases, the development of the tibial epiphysis is extremely interesting.

Gray says that one centre for the upper epiphy six appears at birth, and that there is formed from it a thin, tongue shaped process in front which makes the tubercle, and adds that an additional centre occasionally exists for the tubercle. Schlatter, in his clinical studies, and Ludloff, in his investigations con cerning the development of bones entering into the knee-joint, have determined the existence of two centres for the tubercle and their peculiar appearance seen in profile by means of the X-ray.

General skiagraphic work has brought to light the greater frequency of finer epiphyseal injuries, heretofore unknown; as for example, epiphyseal separation of the epicondyle or partial fracture of the lower epiphysis of the humerus; and it is not surprising that such a prominent and exposed epiphyseal surface, and therefore one so liable to violence, as that of the head of the tibia should suffer injury. Nor would it be unexpected for such injury to produce more than a single pathological state. So that what might be called Schlatter's disease, a condition described above and due to injury of the epiphyseal tubercle-centres of ossification, might fairly include a local osteitis in its pathology as well as fracture and partial dislocation of the ossifying centres.

A case not greatly dissimilar to Schlatter's is herein described, and, while it differs in certain particulars from his, it may broadly and not unscientifically be classed with them. The absence of a history of traumatism may be disregarded in the instance of an active, playing boy. The skiagrams, however, appear to unmistakably denote an inflammatory lesion about the tubercle-centres in my case, while there seems to be no dislocation of the centres or callous formation, as in Schlatter's cases, and the bilateral symmetry is not common to his.

In other words, the case described resembled Schlatter's in its clinical features, and, while there was no actual evidence of traumatism or dislocation of the tubercle-centres, yet it is not improbable that some slight injury, with or without a latent infection (as from that occurring two and one-half years before), had produced an inflammation of the tubercle-centres of ossification.*

^{*}Since writing the above, the article by Ware, of New York, on Fracture of the Tibial Tubercle, has appeared in the November Annals of Surgery for 1904. Also the following references bear upon the general subject:

O'Donoghue. Avulsion of the Tibial Tubercle. Boston Medical and - Surgical Journal, June 11, 1903.

Osgood. Lesions of the Tibial Tubercle occurring during Adolescence.

Boston Medical and Surgical Journal, Vol. cxlviii, No. 5.

Poland. Traumatic Separation of the Epiphyses, 1901.

TRANSACTIONS

* THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, November 7, 1904

The President, HENRY R WHARTON, M D, in the Chair

COMPENSATORY KNEE JOINT BETWEEN THE TIBIA AND SEMILUNAR CARTILAGES

DR. JOHN B ROBERTS reported the case of a lady of middle age who some five or six years ago applied to him for treatment of a painful knee joint. In early childhood the knee had been operated upon for what was probably tuberculosis. After a long period of treatment the joint had recovered, with a considerable amount of stiffness. As a result of this infantile disease, the limb had never fully developed, and was shorter than the normal extremity on the other side. Compensatory mobility of the pelvic joints had enabled the patient in adult life to walk with only a moderate amount of limp, notwithstanding the dissimilarity in length of limbs and the defective mobility of the knee. When the knee was examined by Dr. Roberts, he found the scar of an old operation on the inner side, and observed that movement was possible from the nearly extended position through about one third the normal arc of flexion.

The patient had been treated for gout by various European physicians. He also for some weeks treated the painful knee as a condition due to litherima. Pain persisted, and interfered to a considerable extent with the patient walking up and down stairs, though it did not preclude a moderate amount of exercise. He finally concluded to open the joint, with the expectation of finding, perhaps, a floating intra-articular cartilage. Incision on the inner

side of the knee revealed the interesting condition which he desired to report.

The motion of extension and flexion, which has been mentioned, was found to take place, not at the seat of the normal motion of the knee-joint, but between the semilunar cartilages and the head of the tibia. The semilunar cartilages were firmly attached by bony adhesions to the condyles of the femur, as the result of a destructive inflammation of the cartilage, covering the ends of the femur, in infancy. He found no floating cartilage in the joint and no dislocation of the internal semilunar cartilage, which was the one exposed freely to view. There was no reason to suspect any such difficulty with the other cartilage. The synovial fluid was somewhat blood-stained, as though the condition giving rise to pain was a slight synovitis. The wound was closed, and, though some superficial infection took place, the final result was an improvement in the painful condition. The mobility of the joint was only slightly, if at all, lessened by the operation.

The case was reported simply to record an interesting pathological result of old tubercular inflammation of the knee-joint.

The method by which the condition arose is, however, easily understood. The semilunar cartilages became attached to the lower end of the femur by reason of inflammation causing erosion of the articular cartilage on the end of that bone. As a result of this occurrence in early life, a compensatory mobility was established between the semilunar cartilages and the head of the tibia by means of an increased relaxation of the ligamentous attachments.

TYPHOID PERFORATION SUCCESSFULLY TREATED BY MAKING AN ARTIFICIAL ANUS, WITH SUBSEQUENT INTESTINAL RESECTION.

Dr. J. Chalmers Da Costa stated that he had operated five times for perforation in typhoid fever. Two of the patients died very soon after the operation. In one, the perforation was not found at the time of operation; and necropsy disclosed it in the hepatic flexure of the colon. This case was reported by Dr. Herman B. Allen. The fourth patient lived eight days after the closure of the perforation, but afterwards died rapidly from

a second perforation Necropsy disclosed the fact that the first perforation was completely healed The fifth case, which he now reported was the only successful one in the series

The patient was a man thirty four years of age, who was sent to the Jefferson College Hospital on the 26th of May by Dr Godfrey. The perforation had taken place twenty-four hours before admission, and Dr Godfrey had been unable to persuade the family to allow immediate operation. The patient was in the end of the second or the beginning of the third week of the tvolhoid fever.

On admission, the man's condition was bad, but not hope lessly so There were marked evidences of peritoritis, severe tenderness in the lower abdomen, most marked on the right side, muscular rigidity, respiratory immobility, diminution of hepatic dulness, and a pulse of 118, with a temperature of 102²/_s° F Operation was performed immediately, the incision being made in the right than region

The moment the peritoneum was opened, fæcal matter welled out A perforation that would admit the index-finger was dis covered in the ileum, a little over two feet from the ileocaccal valve, and opposite the mesenteric border of the ileum. This perforation was closed in the usual manner with two layers of situres.

Examination of the ileum on the proximal side of the perforation did not reveal any ulcerations that seemed liable to perforate Between the perforation and the ileocateal valve there were several ulcers on the point of perforating, one being at the extreme lower end of the aleum. To have inverted them would have destroyed the lumen of the bowel. The patient's condition was by this time absolutely desperate, and resection was not to be thought of, particularly as the situation of the ulcers would have made it imperative to resect a portion of the colon with a portion of the item. He therefore performed an enterostomy on the proximal side of the sutured perforation by Professor Bodine's method. He chose this method so that he might be able at a later date to readily re establish the lumen of the bowel. After the performance of this operation, the belly was cleaned strands of gauze were introduced for drainage, the abdominal wound was closed, and the patient was returned to the ward.

For two days the man's condition was absolutely desperate. On the morning of the second day after the operation, the temperature was still $96^2/_5$ ° F. On the evening of the second day, the condition notably improved; the temperature rose to $98^1/_5$ ° F., and the pulse dropped to 98. On the morning of the third day, the temperature was normal. Quantities of pea-soup stools passed from the artificial anus. During the next few days the temperature remained normal, the diarrhæa greatly lessened, and there was no pain or discomfort. Each segment of the intestine was washed out gently, twice a day, with normal salt solution.

On the 5th of June, ten days after the operation, the patient was suddenly seized with violent pain in the right iliac region; the pulse rose from 80 to 108, and the temperature to 101° F. The pain continued throughout the night; but in the morning, before breakfast, it was relieved, and fæcal matter was found to be flowing out along the outside of the proximal section of the bowel. It seemed evident that another ulcer had perforated on the proximal side of the artificial anus, not into the peritoneal cavity, but into the zone of adhesions. The day after the appearance of this discharge, the temperature and pulse fell to normal; and from this time onward recovery was uninterrupted. The patient gained distinctly in weight.

The evidences of typhoid rapidly disappeared after the first operation, nothing but the nature of the stools remaining to suggest typhoid when the second perforation occurred, ten days later. After the second perforation took place, there was not a symptom of typhoid; and the stools, although soft, became normal in character. It was considered wise to wait for a time before operating for the closure of the artificial anus. The patient had been through a severe crisis and was much exhausted; and, as he was gaining in weight and strength, the delay would be advantageous. The bowel was probably still in a dangerous state, and might perforate from slight pressure. Delay would permit the peritoneum to attain that resistance to infection which is the rule in a case of long-standing artificial anus. During this wait, the skin of the abdomen became frightfully inflamed and infiltrated, from the constant contact with soft fæces; and the utmost care in cleanliness and the employment of a rubber cap, as used in iliac colostomy, failed to amend this condition.

On the 21st of October, he operated for the closure of the artificial anus It was evident that he could not use Grant's clamp, on account of the existence of the second perforation on the proximal side of the artificial anus, an opening that was still patent, as shown by the continued oozing of faces up from outside the bowl. He opened the abdomen above and to the outside of the anus, felt his way with the fingers inside, removed the portion of badly infiltrated skin, and resected the artificial anus. The second perforation was observed about two inches above the opening of the proximal segment of the bowel, it had evidently not been into the free pentioneal cavity, but into the adhesions that had formed about the artificial anus. The distal segment of the bowel was very much smaller than the proximal, owing to having been so long out of function, consequently, and to end anastomosis was not performed. The lateral method was selected, and was effected by simple suturing. When just ready to close the abdomen, it was found that the gall bladder was enormously distended, consequently, a tible was inserted for dranage. It may be noted here that a bacteriological investigation showed the bile to be sterile. The patient went on to uninter rupted recovery.

DR. JORN H GIBBON had operated upon a perforating ty phoid ulcer which was similar in many respects to the one reported by Dr. Da Costa. In his case there was an unusually large perforation. The perforation and ulcer involved so much of the caliber of the bowel that closure was impossible. A resection was done and an end to end anastomosis made. The patient died about thirty six hours after the operation.

Dr Gibbon was of the opinion that in cases such as this one it would be far better to surround the perforated bowel with gauze and establish thorough dramage. This he thinks would be better than withdrawing the bowel entirely out of the wound. If necessary, the bowel could be attached to the peritoneum by catgut. In cases of this kind, where the patient is in bad condition and where there has been considerable outpouring of intestinal contents, the performance of extensive operative procedures is not warranted and the simplest treatment gives the best results. It is also thought that dramage of the intestinal contents through the wound is some protection against the perforation of other threatening uleers.

Dr. James P. Hutchinson cited a case to illustrate the difficulty met with at times during attempted turning in of typhoid ulcers with subsequent fistula. The patient was a woman in whom perforation had occurred, the opening being about the size of a lead-pencil. The size of the ulcer and the condition of the bowel prevented turning in of the ulcer, and instead the thickened omentum was employed to cover the damaged intestine. The patient made a slow recovery, foul pus being discharged for some weeks. In this case Dr. Hutchinson believed a fistula existed, which eventually closed without operation. This result was accomplished by simply walling off the area of perforation with gauze. Dr. Hutchinson feels that recovery would not have followed turning in of the ulcer in this case as obstruction would almost surely have resulted. He employed resection in one case where there was an intussusception in addition to several perforations, one and one-half feet of the bowel being removed. The patient lived thirty-six hours, death being due to peritonitis. Dr. Hutchinson believes the patient's chances would have been better had the method used by Dr. Da Costa been employed in this case, or in any case in which resections may be necessary.

DR. ROBERT G. LE CONTE agreed with Dr. Da Costa that resection of the bowel is a most hazardous procedure when the perforation is so large that it cannot be closed by suture. He had done it once and lost his case. He did not, however, approve of making a formal artificial anus, as described by Dr. Da Costa, where other portions of the bowel were deeply ulcerated, as under the circumstances, should another ulcer perforate, a successful termination, as shown in Dr. Da Costa's case, will but rarely occur. Where the opening is large and other portions of the bowel seem seriously inflamed, he agrees with Dr. Gibbon that the safest plan is to wall off this area of the intestine with gauze from the general abdominal cavity. He had resorted to this expedient twice, and in both instances his patients recovered.

PERFORATED GASTRIC ULCER, FOLLOWED BY THE DE-VELOPMENT OF AN ABSCESS BETWEEN THE LIVER AND STOMACH.

Dr. J. Chalmers Da Costa reported a case of perforated gastric ulcer in a girl of sixteen years. The perforation was en-

compassed by adhesions, and was followed by the development of an abscess between the stomach and the liver In this case the diagnosis was extremely obscure, one suggested diagnosis having been tuberculosis and enlargement of the kidney. The patient had tuberculous consolidation of the apex of the right lung

He referred to this case in order to show a deceptive skiagraph, which seemed clearly to show two calculi,—one, it might be thought, in the kidney, and the other in the ureter. He, however, followed a rule that he beheved to be sound, that is that the clinical symptoms form the best guide, and accordingly he opened the abdoenen, found and drained the abscess, and closed the perforation. On conducting a search to discover whether or not there was trouble with the kidney and ureter, he quickly found the cause of the deceptive shagraph, there were two calcufied colic glands. He had no doubt that such deceptive pictures had occasionally misled surgeons into operating for stone in the kidney when none existed.

stone in the kidney when none existed

DR JOHN H GIBBON referred briefly to two cases of perforated gastric ulcer which he had operated upon since his report of four cases made before the Academy about a year ago The first patient was a man fifty years of age, who gave a typical history, and had the typical symptoms of gastric ulcer He was seen twenty-four hours after the onset of acute symptoms He then had a general peritonitis, the abdomen was scaphoid and intensely rigid. The diagnosis of perforated gastric ulcer was made and the abdomen opened. The peritoneal cavity was found filled with seropus In the lesser curvature of the stomach near the pylorus was an indurated area supposedly marking the site of an ulcer, but there was no perforation Opening of the lesser peritoneum revealed no perforation on the posterior wall. The duodenum contained no ulcer, and the appendix appeared normal The abdomen was closed with drainage, and eighteen hours later the patient died Post-mortem examination revealed an ulcer in the indurated area of the stomach, there was no perforation, nor even signs of threatened perforation, and there was no other ulcerated area in the stomach or intestinal tract. Dr Gibbon believes that peritonitis was caused by the ulcer, without perfora tion A second patient, operated on twelve hours after the onset of acute abdominal symptoms, had a perforation of the anterior

wall of the stomach near the pylorus. He lived four or five days after the operation. He had been a hard drinker, and died apparently from delirium tremens, as he manifested all the symptoms of that condition, and there was no evidence of spread of the peritonitis. This man had been treated for three years for gastric ulcer, and operation revealed adhesions between the stomach and liver; these probably had ruptured and allowed the escape of material which had been held between the two organs, thus giving rise to the acute peritonitis.

GASTRO-ENTEROSTOMY FOR ULCER OF THE ANTERIOR WALL OF THE STOMACH, NEAR THE PYLORUS.

Dr. Da Costa reported a third case in which an operation had been performed for ulcer of the anterior wall of the stomach, near the pylorus. He performed gastro-enterostomy, according to the method recently described in the Annals of Surgery, by Scudder, of Boston. In ease of performance and in perfect cleanliness, he found the operation most satisfactory.

After its performance,—that is, the day after the operation,—this patient vomited quantities of bile. The second day after operation, this condition still continuing, he was obliged to consider what he could do for the girl if it was not quickly arrested. Fortunately, however, it was arrested by frequently washing the stomach; but the development of the vomiting led him to think that a serious objection to Scudder's operation is that, should a vicious circle be formed, it could not be remedied by enterographic and a vicious circle be formed, it could not be remedied by anastomosis, on account of the bowel having been picked up too close to the duodenojejunal junction.

The following facts seem perfectly clear:

1. If a vicious circle exists after this operation, enteroanastomosis is impossible; and there is open only one of two methods: First, as was suggested by Dr. Francis Stewart, ligation of the pylorus; and, second, as occurred to him, the opening and drainage of the gall-bladder. This suggestion may have been made before, but he was not aware of it.

He did not know what percentage of the bile that comes down the hepatic duct is taken externally when the gall-bladder is drained, but certainly a great quantity of it escapes. If one could by this method remove a large percentage of the bile that

would otherwise enter the duodenum, one would thus intercept a great amount of the bile that would otherwise enter the stomach, and it seemed to him that this method of procedure should at least be thought of in any case of vicious circle. This patient fortunately for her, recovered without the employment of either of these procedures

It has been affirmed by some operators that the vicious circle does not occur after posterior gastro-enterostomy, but personally, he believed that it may occur after any form of gastro enterostomy, if the pylorus is open

DR WILLIAM L RODMAN regarded as most valuable the suggestion of Dr Da Costa to drain the gall bladder for over coming the vicious circle following gastro enterostomy. This sequel is not so apt to follow posterior gastro enterostomy but if does follow both the anterior and posterior methods and perhaps more frequently than is generally admitted. One surgeon recently stated that a large number of his cases developed the vicious circle. Dr Rodman is surprised that no one has before suggested the expedient menhoned by Dr. Da Costa, and in a future case he would not hestate to employ it.

DR ROBERT G LE CONTE could not see that in eases of vicious circle after gastro enterostomyy, any advantage would be derived from drawing the gall bladder. Reasoning from analogy, where the gall bladder is drained and no obstruction exists in the cystic duct large quantities of bile will be drained off from the gall bladder, but at the same time the color of the stools remains normal showing that a considerable portion of the bile must escape through the common duct into the bowel

In the vicious circle no obstruction to the common duct exists, and it did not seem to him that much would be gained by opening the gail bladder and draining off the bile that enters that organ while the remainder passed freely into the intestine. Where the vomiting is obstimate after gastro-enterostomy, and is not releved by washing out the stomach and the sitting posture, he believes the obstruction is generally due to adhesions and nothing short of an exploration of the field of operation should be attempted.

DR FRANCIS T STEWART said he had been convinced of the plausibility of Scudder's operation which had been mentioned in the case reported. In two cases of gastro-enterostomy in which

he had employed this technique, the vicious circle was established. One patient died, the other vomited for days, and finally recovered after refusing a second operation. Dr. Stewart's intention in this case, had permission to operate been obtained, was to ligate the pylorus or some point near it. He does not believe that drainage of the gall-bladder would aid recovery in these cases. Scudder's operation differs from Moynihan's in location, being at the beginning of the jejunum, and thus rendering entero-anastomosis impossible.

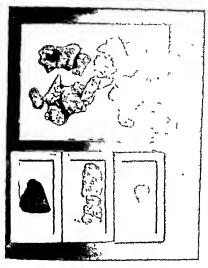
Dr. Da Costa, in closing, said that Dr. Le Conte had raised an important point regarding the utility of draining the gall-bladder in cases of vicious circle. Dr. Le Conte is of the opinion that only a part of the bile passes externally after draining the gall-bladder. This same point had occurred to Dr. Da Costa; but he thought that such a large amount passes externally that the stomach would be considerably protected by the procedure, for it seems to have been demonstrated that after every gastroenterostomy some bile enters the stomach, and that a small amount of bile apparently produces little or no disturbance. The disturbance occurs only when there is a quantity of bile; and, by taking a large amount externally every day, one would certainly diminish greatly the amount that would be present in the duodenum and which could enter the stomach.

Dr. Da Costa, of course, recognizes the fact that the suggested expedient is a pure experiment, and might completely fail on trial; but he believes that, had the vomiting continued in the case reported, a trial of the operation would have been justifiable. Dr. Le Conte's objection that this would not prevent the intestinal contents from points further down from entering the stomach did not seem weighty to Dr. Da Costa, as he does not believe that in most of these cases any of the intestinal contents from farther down reaches the stomach. If it should do so, it would give evidences of its presence; and these evidences would, of course, contraindicate the operation of draining the gall-bladder.

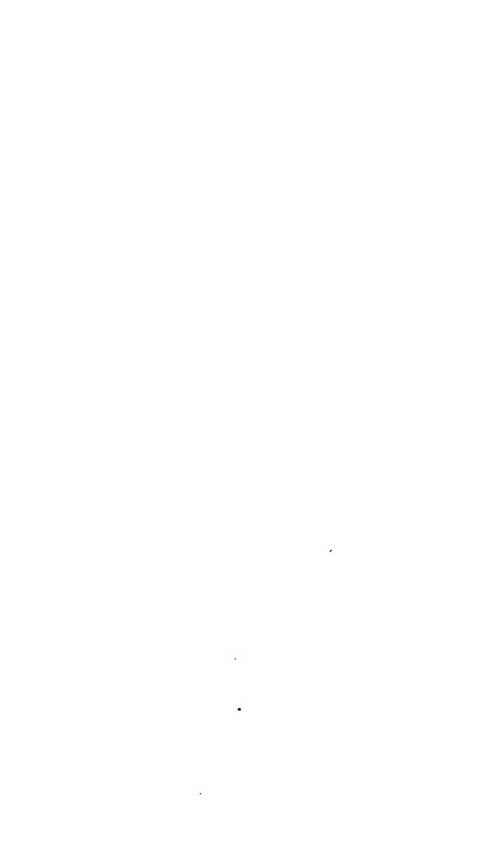
NEPHROLITHOTOMY.

Dr. Gwilym G. Davis reported four cases in which he had removed renal calculi by incision into the kidney.

CASE I.—Laborer, aged thirty-three years. Six years ago



F gures showing the calcularemo ed D Day is cases of neptrol h tom



he had several attacks of what were probably renal colic. His present illness dates back five months He contracted a heavy cold with cough fever, and pains all over his body During this illness he was seized with a sharp pain in the right lumbar region. It was localized and cramp like in character. He was confined to bed for two days, and then went back to work and remained at it for a month. He then fell sick and indisposed, with sharp pain in the right lumbar region. He also had headache. The pain in the side lasted thirty six hours, and then suddenly ceased and there was a sensation as of something passing into the bladder. Since that time he had vomited a great deal, had some difficulty in urinating, and passed bloody urine. The urine stopped suddenly, but sounding failed to find any stone in the bladder. There was a skiagraph taken by Dr. C. H. Leonard, and while the indications were not at all marked, he still expressed the opinion that a stone was present. Urine was sometimes acid sometimes alkaline, and at others neutral. Sometimes it con tained pus and blood. Specific gravity, 1018 to 1022. few bacteria.

Operation—An incision about four inches long was made on the right side obliquely downward from the twelfth rib. The kidney was drawn out and the stone located by a needle. An incision about an inch long was made on the convex surface of the kidney, through which a triangular shaped stone was extracted (Fig. 1). This incision was closed with four catguit sutures passed directly through the kidney with a round needle and the with sufficient firmness to close the wound and stop the bleeding. The external wound was closed at each end and packed in the middle. In attempting the removal of the gauze, free heamorthage occurred. The packing was allowed to remain for several days longer, and was eventually removed and subsequent convalescence was rapid and uneventful

The first examination of his urine showed it to be red in color from blood. Specific gravity, 1018, alkaline in reaction no crystals, but plenty of bacteria.

Ten days later it had a specific gravity of 1020, was pale straw color, faintly alkaline, and contained some pus-cells and bacteria as well as some alkaline phosphates. A still later examination gave a neutral reaction, no albumen, pus, or blood, and but few bacteria. There were some urates and uric acid crystals.

The calculus was heart-shaped, twenty-five millimetres (one inch) wide by thirty millimetres long, and about ten millimetres thick. An examination by Professor John Marshall showed that it was composed of calcium oxalate (mulberry calculus), and that it weighed 7.3 grammes (110 grains).

CASE II .- Young man, aged twenty-one years. He stated that a doctor had removed a stone from his bladder when he was four years old. Present illness began three and a half years ago with sharp, lancinating pain in the right lumbar region, extending as far forward as the mid-axillary line. For a year after this attack he felt well, when he had another, and then two more, two months apart, in which last one he had continuous pain for two months, when it ceased, and was absent for four months. The first of these attacks confined him to bed, and the pain was relieved by lying on the right (affected) side, while it was increased by lying on the left side. He has never had sick stomach, nor has the pain ever radiated down the ureter or testicle. On admission to the hospital he was a moderately well-nourished young man, sallow complexioned, with acne of the face. Pulse good, tongue normal; he complained of pain in the right side of the lower half of the chest and in the right lumbar region. There was tenderness on pressure, but no fulness. A skiagraph, taken by Mr. Riedel, showed a faint shadow about two inches from the median line and just below the costal margin. During the week previous to operation he had a slight chill, with temperature 100° to 101° F. Headache, coryza, slight conjunctivitis, and cough. These symptoms disappeared previous to operation. The urine was cloudy, yellow, with a dense white sediment; faintly acid in reaction; a few blood-corpuscles, and a marked trace of albumen. No casts, but an abundance of pus. Later it still continued turbid, contained pus, and its reaction became alkaline; it contained crystals of the triple phosphates.

Operation.—Under ether anæsthesia, a four-and-one-half inch incision was made down and out from the twelfth rib. The kidney was found much enlarged, capsule inflamed, thickened, and densely adherent. Kidney delivered with difficulty. A thin sac from three to ten millimetres (one-eighth to three-eighths inch) thick was all that remained of the kidney substance. This covered a large mass of stones, which were removed through an incision on the convex border. (Fig. 2.) The wound was packed

and drained Recovery from the operation was prompt, there being but little shock. In the course of the week following the operation he had an attack of congestion of the lungs, which cleared up and the gauze packing was removed without difficulty. He passed from fifty one to sixty ounces of urine per day, and the urea ranged from 19 per cent to 2 per cent. The wound healed rapidly and was soon entirely closed, and, though the urine remained turbid, he seemed in excellent health, and later left the city. The calculus was composed of triple ammonium, magnesium phosphates, and weighed 953 grains, nearly two ounces or sixty two grammes.

CASE HI —This was a young married woman aged twenty years Present illness. For the past four months complained of attacks of pain coming on at irregular intervals, but bearing no relation to the menstrual periods. The pain was described as dull and "pressing," at times it was sharp, commencing in the right lumbar region and radiating to the iliac and umbilitial regions and down the right leg as far as the knee. No history of other attacks of renal colic. The pain was somewhat relieved by bending forward, vomiting occurs at times during these attacks. She had fully sensations, but only one chill previous to operation. Was unable to bear the constriction of the clothing around the waist. She had had trouble with her urine for months. It dribbles away, and its passage was accompanied by straining. There was increased frequency of urination but no burning. It has been milky in color and ropy in consistency. No history of the passage of gravel or calculi. Urine, specific gravity, 1028, moderately acid, heavy trace of albumen. No casts, light amber in color, cloudy, and contained an abundance of pus.

On admission she was of a rather spare build, face flushed tongue coated, abdomen not distended, no tumor discoverable. There was tenderness, not marked, in the region of the right kidney and right liac fossa. A skiagraph showed a fairly distinct shadow indicating a probable stone in the right kidney. The urine previous to operation was acid in reaction. Specific gravity, 1013 to 1018, turbid, marked trace of albumen, dense sediment of pus. No casts, a few blood corpuscles, and no tubercle bacilli. A later examination showed some hyaline and granular casts and bacteria in short and long chains. Some oxalate crystals

were found at times. The urea varied from 1.6 per cent. to 2.3 per cent.

Operation.—An oblique incision was made downward and forward from the twelfth rib and a stone ten by fifteen millimetres removed through an incision in the cortex. It weighed about two grammes, and was composed of oxalate of calcium, mulberry calculus. (Fig. 3.) The wound was packed, and on attempting its removal two days later the bleeding was so free that it was reinserted and left five days longer, when it was removed without further bleeding. The wound promptly healed and she was discharged cured.

Case IV.—Married woman aged forty-four years. Present illness began two years previously with a sharp pain in the right side, at first this was intermittent, but later became constant. It radiated downward into the right groin. A skiagraph was made by Dr. Leonard, and he gave it as his opinion that a stone was present. Another skiagraph in another hospital failed to show the stone. An operation was done seven months ago and a large amount of pus evacuated from around the kidney and under the liver. Since this operation a sinus persisted in the loin, which led up under the liver and discharged large quantities of pus. The pains in the side still persisted of the same character and intensity. The urine was yellow, cloudy; specific gravity, 1022; acid; trace of albumen and an abundant white sediment. There were no casts. No crystals, but abundant leucocytes, no red blood-corpuscles.

Operation.—The sinus leading under the liver was slit up by following along the edge of the ribs and a very large amount of pus evacuated. The incision was then prolonged backward and the kidney exposed, and a stone of considerable size extracted. It consisted of calcium carbonate and triple ammonium, magnesium phosphates. It weighed 5.66 grammes (88 grains). (Fig. 4.) The wound was packed, and again there was trouble-some bleeding before the packing was finally removed. Healing was rapid and the sinus closed in a little over a month's time.

Dr. Davis said that the question of diagnosis in cases of renal calculi is not always readily settled. In two of these four cases the presence of a calculus had not been previously recognized. Personally, his belief is that exploratory incision is justified when marked local symptoms point to kidney involvement. Probably

the best means of diagnosis is the X rays, but even they are not absolutely conclusive. The value of an opinion depends largely on the personal skill of the examiner In Case I the X ray indi cations were not at all marked, yet Dr Leonard expressed the opinion that a stone was present, and such proved to be the case The stone was a good sized one of oxalate of calcium, and should have given a good shadow Case II likewise gave a faint show ing, but Mr Riedel claimed that it showed the presence of stone and he was right, but the amount of calculus present was enormous, and should have given undoubted evidence. The fact that it was phosphatic in character may have been the cause of its not showing a stronger shadow. Case III had the smallest stone, oxalate of calcium, and threw a distinct, clear shadow satisfactory in every way It also was taken by Mr Riedel In Case IV Dr Leonard had pronounced a calculus present and another operator had failed to demonstrate it. The former proved to be correct There can be little doubt but that in the hands of a skilled operator the X-rays will almost certainly show the presence of a stone if one is really there. Negative evidence is only to be accepted after repeated failures and the positive evidence is to be interpreted by one accustomed to examine skiagraphs for the presence of calculi. The fact of all these cases involving the right kidney was worthy of note. It seems to show that the right kidney is more liable to calculous disease than the left, as well as more liable to dislocation. Recently a case came under his care in which the symptoms pointed to the presence of a renal calculus in which two skiagraphs were negative Operation revealed an abscess of the kidney with no stone present although small calculi had some time previously been passed from the bladder

The urine in renal calculus is more often acid than alkaline. It may vary from time to time. In two of these cases it was alkaline at some period of the disease, but was most often acid. For part of the time it was acid in Case II, in which the whole kidney was blocked up with large masses of triple phosphates.

The presence of blood in the urine seems to be a reliable symptom. It was present in all the cases at some stage. In the first case there was a history of large amounts of blood coming away with the urine, but in the other three it was small in amount and only occasionally seen. Often it is only to be detected by

microscopic examination. Pain in the region of the affected kidney also showed itself quite a reliable symptom.

As regards the operative procedures, the incision used was an oblique one, extending from the anterior end of the twelfth rib downward and forward towards the anterior portion of the crest of the ilium.

This is preferred to the straight incision of Edebohls along the edge of the erector spinæ muscle because it can be extended both upward and downward if desired. Particular care is necessary in making the upper portion of the incision. The pleura crosses the twelfth rib about at its middle, or a little farther posterior; and if the incision is made up to the rib posterior to that point the pleura is liable to be wounded. The twelfth rib should be carefully identified, as, if it is short, it may be overlooked and the eleventh rib mistaken for it. Additional space can be gained if necessary by prolonging the lower end of the incision along the crest of the ilium. The question of bleeding may prove a serious one. That of the soft parts is readily controlled, and if the kidney is delivered externally the bleeding from it likewise can be checked. There is a temptation in these cases, when a stone is felt beneath the examining finger, to simply incise and lift it out with the forceps. In doing this the bleeding is apt to be exceedingly free and persistent, and only controlled with the greatest difficulty. For this reason no attempt should be made to either search for or extract a stone unless the kidney has been rendered accessible by drawing it out of the wound, or placing strips of gauze beneath each end. When it is once outside, an incision can be made in the convex edge just posterior to the median line and a digital examination made of its interior. After the extraction of the stone the wound is closed by three or four catgut sutures passed directly through the organ a half an inch or more posterior to the edges of the incision, with a round needle, and tied over the wound. This checks all hæmorrhage. While bleeding can be checked by packing forced into and on the kidney while it is lying in its bed, the procedure is dangerous and unreliable. Much blood will almost certainly be lost, and the patient is liable to be lost also. If packing has been resorted to its removal is likely to be followed by a renewal of the hæmorrhage, and it may be profuse. For this reason it is well to wait for several days and then inject peroxide of hydrogen to loosen the gauze, and if it does not come away readily to allow it to remain until it becomes loosened of itself. It is well to put a rubber tube around each end of the kidney, securing them outside the wound, so that the kidney can be lifted up if neces sary to control bleeding. These tubes can be taken away after the gauze has been removed and all danger of hæmorrhage passed. Healing in his cases had been prompt, and, though urine began to discharge externally almost at once, it ceased in a few weeks as the wound closed. It will take longer for the urine to clear, and it may remain turbid for a long while after the wound has healed and all calculous symptoms have disappeared.

DR. ROBERT G. LE CONTE said that in his first operative cases of renal calculus he was very greatly concerned about the hemor friage, which appears very alarming. As a rule, however, the hæmorrhage will lessen in a few minutes, or can readily be con trolled by gauze packing. He did not fear to incise a kidney which could not be delivered through the wound, as he had seen two cases where delivery of the organ was impossible and after incision the hæmorrhage was readily controlled by packing. If packing has been used to control hemorrhage it should not be removed for a number of days, and then only after every pre caution has been used to loosen it, namely, salt solution per ovide, etc.

In answer to a question by the President, Dr. Le Conte said he had seen a renal calculus in a child under one year the stone having been found at the post mortem examination

DR. HENRY R WHARTON, speaking of the age of subjects of renal calculus, said he had seen one in a child of nine years. The patient had an abscess of the pelvis, and after operation the calculus was discharred from the abscess cavity.

Dr. Davis, in closing, said the line of incision in opening the kidney should be at the point of anastomosis, of the anterior and posterior vessels, which is slightly posterior to the middle line. Regarding hæmorrhage, he felt a stone in the kidney in one case and thought it could readily be lifted out, he at once incised the organ and introduced forceps, which brought away only part of the stone, several trials being necessary to clean out the fragments. Hæmorrhage was severe and he believes it would have been better to first secure control of the kidney before making attempts at extraction.

SARCOMA OF OVARY.

DR. JOHN H. GIBBON exhibited a solid ovarian tumor which he had removed the same morning. The patient was a woman fifty-two years of age, who had passed her menopause seven years. The duration of the tumor was said to be three years. The patient's abdomen was so distended with ascitic fluid that she was obliged to occupy a semi-sitting posture all the time. The tumor was easily palpable through the abdominal wall, and was quite movable. The tumor was easily removed, there being no adhesions. It involved the ovary only, the tube and broad ligament being entirely free from disease. A number of quarts of fluid were removed from the cavity. The patient recovered promptly from the operation.

. The tumor was a large, rather elongated, irregular, lobulated mass, with a central constriction and a definite cavity large enough to admit an egg on the under surface. Its largest diameter was 20 centimetres by 1.3 by 6 centimetres. To one end was attached the remains of the Fallopian tube, which was quite small, and the tubo-ovarian ligament. The surface was quite smooth and practically free from adhesions. The tumor was mottled yellow, white, and pink. Large blood-vessels ran over the surface and a few small cysts were seen containing clear fluid. The margins of the cavity on the under surface were overhanging, rounded, and contracted in appearance; the cavity itself in places was lined by soft, yellow, stringy material. The tumor generally was exceedingly hard. On section, one received the impression that the main portion of the tumor formed a wall for the cavity, this wall averaging from two to three centimetres in thickness and was very firm in consistency. The cut surface was granular, irregular, and decidedly gritty to the knife, and was of a pale canary color streaked with white. At one pole of the tumor the wall gradually faded into a mass which formed the broadest portion of the growth; here the cut surface was quite granular, irregular, moist, streaked or mottled red, white, and yellow. The Fallopian tube was apparently normal. Weight, 800 grammes. A microscopic examination of the growth showed it to be a fibrosarcoma.

Dr. Warfield T. Longcope said the tumor was probably a carcinoma or an endothelioma. It is quite surely malignant now,

even if it did not start as a malignant growth. The shape of the specimen and the necrotic area in the centre suggest its origin from the wall of a corpus luteum, but such a diagnosis could hardly be ventured without further study.

DR. ROBERT G LE CONTE said that the tumor shown was one of the most remarkable growths he had ever seen. He had never encountered a pure carcinoma of the ovary, although he had had several cases of proliferating papillomatous cyst. In these cases ascites was uniformly present, even when the malignant disease was confined to the cyst, and did not involve the perioderum.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, November 7, 1904.

The President, L. L. McARTHUR, M.D., in the Chair.

THROMBOSIS OF SUPERIOR MESENTERIC ARTERY.

Dr. Louis A. Greensfelder reported the case of a man, aged forty-seven years, who entered the Michael Reese Hospital, July 23, 1904, at 6.30 p.m., with the history that no passage of fæcal matter, blood, or flatus had occurred for three days prior to admission; he could retain nothing by stomach; vomited colorless watery fluid; had severe sharp diffuse pain in abdomen; no chills; marked dyspnæa and prostration, and facies typical of a severe intraperitoneal lesion. Temperature, 98.4° F.; pulse, 88; respirations, 24. Physical examination of abdomen revealed a greatly distended abdomen. Percussion note was tympanitic, except in right groin and lumbar region, where it was dull. Palpation negative. No peristaltic wave to be seen or felt. Rectal examination negative.

Urinalysis.—Specimen obtained by catheter; quantity three and a half ounces, with a specific gravity of 1016. No albumen. No sugar. Trace of indican. No casts and a few leucocytes.

At 8 P.M. of the same day, under ether anæsthesia, a four-inch incision was made along the outer border of the right rectus. As soon as the peritoneum was opened, a large amount of bloody fluid without odor escaped. The appendix was sought for and found to be normal. Then a large loop of small bowel was seen to be discolored, and when brought into the wound eight and one-half feet (102 inches) of small intestine were found to be

gangrenous, which were clamped off, and again clamped off at the mesenteric border and removed. The mesentery was tied off with catgut, and the ends of the bowel approximated by a Murphy button. A Mikulicz drain was inserted, wound closed with silkworm gut sutures, and dry dressing applied. Operation lasted two hours. Pulse at close of operation, 128

July 24 Pulse, 88 to 100, temperature, 100° F, respirations, 40 One involuntary bowel movement Leucocyte count, 9000 Urine, two ounces, ss

July 25 Pulse, 88 to 90, temperature, 99 6° F, respirations, 36 One slight bowel movement. Hyaline and granular casts Urine, four ounces

July 26 Pulse, 84 to 83, temperature, 99° F, respirations, 32 Five bowel movements Urine, four ounces Hyaline and granular casts

July 27 Pulse, 76 to 84, temperature, 99° F, respirations, 36 Two bowel movements Urine, six ounces

July 28 Pulse, 84 to 92, temperature, 102° F, respirations, 48 Patient unconscious at 850 PM

Pulse began being imperceptible at 6 Expired at 11 15 PM. The pathological report on the organs after removal from body was Thrombosis of superior mesenteric artery, with hismorrhagic infarction of small intestine involving greater part of ileum, general arteriosclerosis, especially marked in abdominal aorta and its branches, fatty infiltration and hypertrophy of heart, chronic fibrous endocarditis of aortic valves and right ventricle, obliterative pleuritis of the right side, healed area (tubercular (?)), left lower lobe. Cloudy swelling and fatty in filtration of liver.

The aorta had on its intima numerous raised gray and yellow areas, irregular in shape, varying in size from a pinhead to a lima bean. On cross section the change was apparently finited to the intima, which was greatly thickened. There was no ulceration or calcification. These changes were most marked in the abdominal aorta, where there were several hæmorrhagic areas and small clots adherent to the walls, in addition to the above plaques. The orifice of the superior mesenteric artery was almost totally obliterated by a firm red clot extending into the vessel. The right and left renal vessels were similarly affected, but to a less extent.

INTUSSUSCEPTION.

DR. L. A. GREENSFELDER reported the case of a man, aged eighteen years, who walked into the hospital, August II, 1904. On admission at 3 P.M., the following history was obtained: Illness began six days ago, with a sudden, severe pain in the epigastric region, with nausea, vomiting, and constipation. Patient then consulted a physician, who prescribed castor oil, magnesia, etc., all of which the patient promptly vomited. During the first three days of the attack patient had a number of loose, watery bowel movements, with continual vomiting. The three days prior to admission was constipated. The pain in last few days become localized in the right iliac region. No chills, no headaches, cannot sleep, and has vertigo when he walks. Past history was negative. Never had a similar attack. No sickness of consequence.

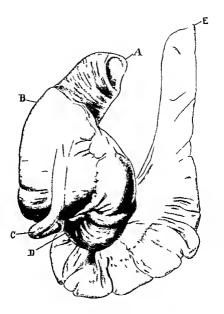
Physical examination of abdomen revealed a tumor in the right iliac region. The abdomen was not tympanitic, and the tumor mass could be felt by rectum. Temperature, 98.8° F.; pulse, 114; respirations, 24.

Urinalysis.—Specific gravity, 1031; urea, 3.0 per cent.; no albumen; no sugar; indican present. Leucocytes few. No casts.

White blood count, 15,400 at 4 P.M.; 15,200 at 7 P.M. High rectal tube was introduced; no flatus was passed. He was given a low pressure enema, after which considerable blood was passed. Nothing was given by mouth, but rectal feeding of peptonized milk and beef peptonoids was given every six hours. Ice-bag to abdomen during first twelve hours. Temperature remained at 100° F.; pulse, 82 to 88. Had a slight bowel movement at 4 A.M. and 7 A.M., with flatus and considerable blood.

August 12. Temperature, 98.8° F.; pulse, 82; respirations, 24. Amount of urine in twenty-four hours, thirteen ounces. Urinalysis negative. White blood count, 12,600. One bowel movement at 9 P.M. and another at 10 P.M., both containing blood.

August 13. At 2 A.M. vomited considerable amount of brownish fluid. At 4 A.M. complained of severe pain in right iliac region; abdomen was slightly rigid; pulse, 84; temperature, 99° F.; respirations, 24. At 11.30 A.M. was taken to the operating room. Under ether anæsthesia, a four-inch incision was made along outer border of right rectus. As soon as peri-



I 1-ln u suwept n A apex of us u e pe P e um C appe dx I en et ng
t g I leun Length of bowel esected forty s x nches



toneum was opened, an intussusception (Fig 1) was found at the ileocæcal valve, and lifted out of the abdomen The small bowel entered the large bowel for a distance of about six or seven inches Bowel was found to be gangrenous for about three feet The gangrenous portion, consisting of ileum and colon, was resected by clamping off the gangrenous portion with two clamps at each end and dividing between The mesentery was clamped off and cut, all bleeding points arrested, the bowel was kept warm by the application of hot sponges, and edges of wound protected by gauze packing The cut end of the colon was then closed by two layers of catgut sutures, one penetrating all the coats of the bowel and the second by a Lembert suture Mesen tery was next sutured Repeated attempts were then made to place a purse-string suture around the cut end of the ileum and introduce a Murphy button, but the tissues were so friable that it was found impossible The cut end of the ileum was then sutured to the abdominal wall, forming an artificial anus Rubber tube was inserted into small bowel through artificial anus, and skin incision closed with silk sutures A Mikulicz drain was inserted just below artificial anus, and dry gauze dressing applied Patient put to bed in a very exhausted con dition Operation lasted two hours and ten minutes A pint of normal salt solution was infused under each breast Camphor in ether and strychnine sulphate were administered Pulse, 164, temperature, 102° F, respirations, 28 Dressings were saturated with facal discharges frequently during the first six hours

August 14 Temperature, 1036° F, pulse, 120 to 140, respirations, 28 Forty ounces of urine were voided in past wenty-four hours Urnalysis negative Patient taking water, milk, and Vichy by mouth Had a comfortable night Considerable fæcal discharge through tube

August 15 Temperature, 101° F, pulse, 100 to 120, res pirations, 24 Complains of cough Drank coffee, milk, Vichy and water Twenty eight ounces of urine

August 16 Temperature, 10° F, pulse, 96 to 100, res parations, 24 Patient has taken broth, milk, and Vichy Urine, twenty-two ounces Urinalysis negative Mikulicz packing removed, and one gauze drain inserted into wound A number of bowel movements through artificial anus

August 17. Temperature, 99° F.; pulse, 82; respirations, 22. Wound redressed three times. Urine, twenty-nine ounces.

August 18. Temperature, 98.6° F.; pulse, 84; respirations, 24. Urine, thirty ounces. Frequent changes of dressing were required.

August 19. Temperature, 98.6° F.; pulse, 80; respirations, 24. Patient taking rice soup, egg, milk, and tea.

Patient then continued with normal temperature and pulse, but on account of a severe dermatitis of abdomen and infection of skin edges of the wound, the second operation was delayed until conditions were more favorable.

On September 19, 1904, thirty-eight days after his first operation, the patient was again anæsthetized, and the following operation performed by Dr. E. Wyllys Andrews:

An incision about five inches long was made just to right of rectus muscle, beginning about an inch below costal arch, and carried through muscles and peritoneum. When intestines were exposed, it was found that extensive adhesions had formed between omentum and intestines. These were partly freed and the colon was brought into view. The artificial anus was obliterated by cutting the skin around anus and clamping ileum, which formed the anus. The part above clamp was severed and ileum ligated with strong catgut, and stump covered with Lembert suture. Then a portion of the ascending colon and ileum were brought into view and Lembert suture silk united their serous surfaces. Then incisions were made into colon and ileum, about one and a half inches long, and cut edges united by a Connell suture. The Lembert suture was now continued, and knot tied within lumen of bowel. The omentum was laid over bowel. Iodoform gauze drains were inserted at the site of the artificial anus, and peritoneum was closed with interrupted catgut sutures. Skin closed with silkworm gut and horsehair sutures. gauze dressing applied.

Patient experienced no shock from operation, and following day temperature was 99° F.; pulse, 88; respirations, 20.

August 25. Had first bowel movement. Temperature and pulse have been normal since.

November 4. There is a very small fistula, which contains a drainage tube. Patient is up and in good condition.

Dr. E. Wyllys Andrews said that the matter of friability

of the intestine had been called to his notice in at least two cases, which seemed to be more analogous to a fat necrosis or some kind of degeneration than to peritonitis. In the case reported by Dr. Greensfelder great difficulty was experienced in bringing the intestine out and attaching it to the button, or even to the abdominal wall, by reason of the extreme softness. It would not hold stitches, and this mere mechanical difficulty prolonged the operation very materially. At the time the speaker saw the patient later, when a Connell suture anastomosis was made, there was no such trouble.

A similar case to this was reported to him by Dr. Morgan, in which the stomach wall was very friable. It was a gall-stone case, and in manipulating the gall bladder gently the finger of the operator tore directly into the stomach, making a large opening. It not only tore as wet paper would tear, but it was impossible to suture with needle or even pick up the tissue with forceps afterwards. The slightest touch would tear through it. He never saw the stomach in that condition before. He attributed it to fat necrosis generalized over the adjacent organs. This was probably a case of pancreatitis, the generalized fat necrosis extending to and involving the stomach wall. He was quite sure that pentonitis alone, or mere hypertrophy and distention of the hollow viscera above a point of obstruction, could hardly explain the condition.

DR ALBERT J OCHSNER showed a specimen from a case of intussusception. The patient was a child, fifteen years of age, in whom a diagnosis of intussusception was made seven days after operating for an acute appendicuts. He thought the intus susception was about eight days old when a diagnosis was made, and that the appendicuts was an unimportant part of the condition for which the patient was operated first. In other words, the first diagnosis was wrong, at least so far as the serious condition was concerned.

Dr. VATES stated that about three years previous to admission to the hospital the patient was supposed to have had an acute attack of inflammation of the bowels. There were bloody stools, etc. The patient's recovery from this attack was rather rapid. The second intussusception took place in the ileum, the invaginated portion was fifty two centimetres long. It had existed long enough for the intussusceptium to become gangrenous, so

that the intussuscipiens protruded through the wall of the intussusceptum.

Two days after the onset of the second attack, the patient was sent to the hospital by his physician with a diagnosis of appendicitis, which was confirmed and an immediate operation performed. Upon opening the abdomen, Dr. Ochsner noticed an excess of serum, which was the only feature not referable to the appendicular condition. The boy did not react well after the operation, and because of nausea received but limited amounts of water by mouth. This masked the symptoms by controlling peristalsis.

At the second operation, a week later, it was found that the gangrenous portions of the intussusception had been completely walled off from the general peritoneal cavity by adhesions formed by contiguous loops of intestine and the omentum and preventing a general peritonitis. The gangrenous portions had acted as a foreign body, produced a localized peritonitis which the absence of vermicular intestinal movements had allowed to become enclosed in the adhesions thus stimulated. On the twelfth day symptoms of obstruction reappeared, and an enterostomy was done for its relief. Death occurred the next day, with no evidence of a general peritonitis.

Dr. Jacob Frank said that about two years ago he reported a case of intussusception of the ileum into the cæcum in a child nine months of age, in whom he resorted to the use of the button, the child making a complete recovery. He showed the child before the Society one year after the operation.

With regard to sutures not holding when the intestine was friable, this was seen in cases of appendicitis when the intestine was ædematous. One could with difficulty get the sutures to remain in place without cutting through. In cases of intestinal disease in the acute stage where there was an ædematous or inflammatory condition, this was almost always found to be the case. He did not think it was due to pancreatitis or to fatty embolus. If it were, he thought we would have more deaths. He had found it in a large percentage of cases of appendicitis where the temperature ran high and where there was gangrene of the appendix.

Dr. D. A. K. Steele said that one point of interest in regard to the first case presented was the persistence of the intestinal

fistula, and whether that might not have been due to some foreign material retained in the abdominal cavity, or in connection with the inner end of the fistulous tract Possibly the presence of the Connell suture might explain the persistence of the fistula

With reference to the friability of the intestine and the difficulty of sutures holding, his experience had been the same as that of Dr Frank In many cases of acute inflammatoric conditions of the intestine particularly in appendicitis, and pustubes or infected tubes in women, there was great cedema of the adjacent parts, and the explanation given was correct namely, that it was due to alteration in the wall of the intestine or tube from merely cedema. Dry paper did not tear easily, but if one would wet it, it would tear easily. The same thing could be said of the bowel wall in the same condition.

DR L L McARTHUR sud that it was to Koenig that credit was due for emphasizing the fact that the bowel was friable above the seat of obstruction far beyond that which appeared to the naked eye, and venous septic thrombosis was liable to occur which would terminate fatally although there may have been perfect suturing, the bowel being friable the nearer it is to the gangrenous area, although being vascular and its nutrition not being materially impaired These cases he (Koenig) said would die in spite of perfect suturing from a septic thrombophlebitis in that portion of the bowel above, which had not been excised far enough beyond It was a wise thing to go much farther above than appeared necessary to get a good suture field for the pur pose of getting beyond a venous thrombophlebitis which would scarcely show externally, but which would show when one saw the mucosa and submucosa of that portion of the bowel Cases of mesenteric thrombosis were extremely rare, and were of con siderable interest because of the great difficulty of making a diag nosis before operation. He had occasion to look up the literature in regard to this subject at one time some years ago, in presenting a paper to the Chicago Medical Society, and could only find a record of two cases in which the diagnosis was made before operation In the case reported by Dr Greensfelder, that lived to the fifth or nearly sixth day Dr Greensfelder did not state from what the patient died, whether there was leakage at the point, or whether the superior mesenteric artery, which supplied the entire small intestine and transverse colon, had produced gangrene beyond that portion which had been resected.

DR. GREENSFELDER, in answering the question of Dr. Steele, stated that there was no intestinal fistula at present.

In regard to the remarks of Dr. McArthur, in the patient who had thrombosis of the mesenteric artery there was complete gangrene extending not only to the small bowel, but to part of the colon, death occurring undoubtedly from this condition.

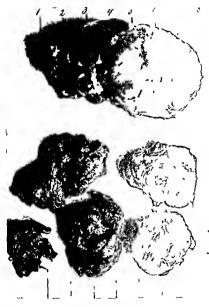
Regarding the statistics of mesenteric thrombosis, he stated that 217 cases had been recently reported by Jackson, Porter, and Quinby in *Journal of the American Medical Association*, with a mortality of 94 per cent. in non-operated cases, and a mortality of 92 per cent. in the cases operated upon.

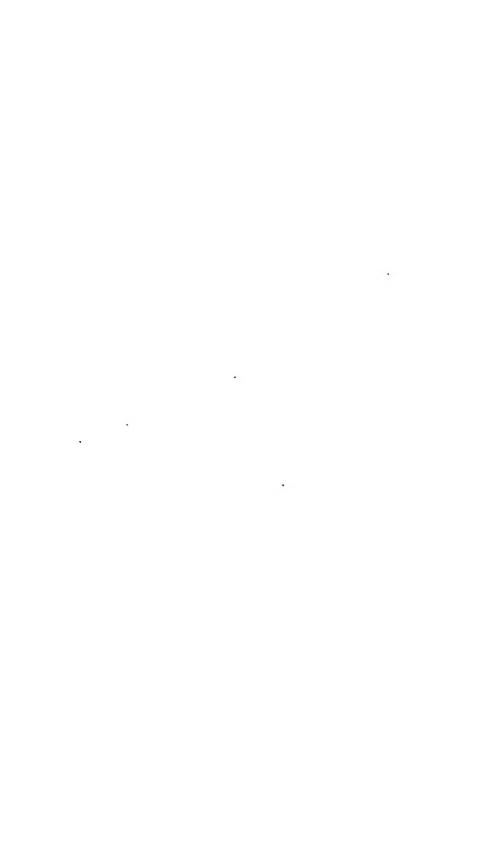
PERINEAL PROSTATECTOMY.

Dr. Jacob Frank reported the case of a man, aged seventy years, who consulted him at his office, May 15, 1904, complaining of having been troubled with frequent and painful micturition for nine months, passing very little urine at the time; and after having had to resort to the use of a catheter several times at intervals during this period, had been compelled to lead daily catheter life for the past five months, suffering agonizing pains, insomnia, anorexia, unbearable pain in bladder, loss in weight, a great deal of residual urine,—quantity in twenty-four hours, fifty-eight ounces, specific gravity, 1023. Albumen present; no sugar; abundance of pus-cells; also some squamous cells; reaction acid; no blood; urea, 2.1 per cent. in twenty-four hour specimen.

Patient was sent to the German Hospital, May 29, 1904. He was put to bed; kept on a strict liquid diet; urotropin, five grains, every four hours; lithia water in plenty; boric acid irrigation of bladder daily at a temperature of 110° F., and the daily use of the prostatic catheter, as the ordinary soft rubber one could not be introduced; normal salt solution twice daily per rectum, as the patient was emaciated and required careful nursing.

The prostate gland could easily be palpated via the abdomen; the lateral lobes were greatly enlarged and very tender. The operation was performed June 2, 1904, four days after admission to the hospital, under chloroform. The patient was put in exag-





gerated hthotomy position, a grooved sound, to be used as a guide for a urethrotomy, was introduced into the urethra, an inverted U-shaped incision was made, the apex of which was taken just over the posterior part of the bulb, and the two arms. each about five centimetres long, midway between the anus and ischial tuberosities After exposing the superficial muscles by blunt dissection, the central tendon was caught by a clamp near the bulb and divided, this freed the sphincter and levator am from their anterior attachment and exposed the rectum drawn forward by the recto urethralis muscle This muscle was then divided and the membranous urethra brought into view This latter step not only exposed the membranous urethra, but pre vented injuring the rectum, as shown by Proust After exposing the membranous urethra, the muscles were retracted and the apex of the prostate was brought into view. The membranous urethra was then opened on the previously introduced grooved sound, and the edges retracted with transfixed silk retractors A 30 French sound was then introduced through the incision into the prostatic urethra and bladder, and the sphincters dilated with a to and fro motion of the sound The prostatic tractor closed, was then carried into the bladder, while the edges of the urethral wound were held open by the silk sutures. As soon as the beak was free in the bladder the thumb screw, which fixes the blades in position, was loosened, the blades rotated by means of the external blades, and fixed by tightening the thumbscrew. The instrument was then handed over to an assistant. who made enough traction on the instrument to bring the gland into the field Lateral retractors were now placed so that, to gether with posterior retractors and the traction produced by the tractor, the entire posterior surface of the gland was exposed The capsule was now incised on each side of the median line for almost the entire length of the posterior surface of the prostate, the two lines being convergent. The bridge of tissue, as claimed by Young, contains the ejaculatory ducts, and hence the patient's potency was not impaired

By means of blunt dissection, and with the aid of Young's forceps, the right and median prostatic lobes were enucleated preceined. The left lobe was enucleated in toto, measuring five by eight centimetres. (Fig. 2)

The tractors were then withdrawn and a double drainage

tube introduced into the bladder through the opening in the membranous urethra, the inlet tube being about one-third the size of the outlet tube. This tube was fastened with a suture to the upper angle of the wound. The lateral cavities left by the enucleated prostatic lobes were packed with plain gauze, and the drainage tube connected with a siphonage arrangement, and continuous irrigation with normal salt solution, 110° to 120° F., thus kept up, the flow being regulated by means of a screw clamp in the inlet tube. The irrigation was commenced on the table to prevent blood-clots forming within the bladder.

On the second day after the operation the patient developed an orchitis on the left side, very likely due to extreme force used by the assistant, which was successfully treated with ice-bags and elevation of the scrotum. The rectal temperature for the first week ranged between 100° and 103° F.; pulse between 78 and 98. The temperature was due very likely to the orchitis, and also to the temperature of the irrigation fluid flowing so near the rectum. No shock; pain for the first two days relieved with one-quarter grain of morphia hypodermically. Two hypodermic injections in all were used.

On the second day the gauze packing was loosened, and some of it withdrawn every day until the sixth day, when all of the original packing was removed, and the superficial wound kept open thereafter with a small gauze pack.

The patient was allowed to sit up in bed with a back-rest on the fourth day. At the end of the week the continuous irrigation was stopped, and the drainage tube withdrawn. On the ninth day a 28 French sound was introduced through the urethra into the bladder, when a soft rubber catheter was carried into the bladder through the meatus, fastened, and the bladder irrigated twice daily with boric solution through this catheter. Five days later the catheter was withdrawn, no urine coming through meatus, as the perineal opening was yet too large. On the nineteenth day the patient passed some urine through meatus, but most through perineal opening. From this time on patient passed some urine, more every day, through the natural channel, and at the end of the fourth week most of the urine passed through the natural opening at intervals of every two hours.

With a 30 or 31 French sound his urethra was sounded every other day, and irrigated once a day after the second week.

In five weeks after operation, patient left the hospital with a very minute perineal fistula, which was dressed daily. At the end of the sixth week all was healed, patient passing uttine every three to four hours, and quite clear. At the time of report the bladder did not contain any residual utrine. He enjoys good health, eats and sleeps well, and has gained considerably in weight.

The man was impotent before the operation, and had re mained so since

DR M L HARRIS stated that ever since Young proposed this technique to preserve the ejaculatory ducts he thought much had been made of very little. These operations were nearly always done on old people, who if they were not impotent, had passed the procreative age, or even the age when sexual intercourse was often indulged in, and so it never appeared to him to be a point of any great importance. Nor could the ducts always be preserved.

The method of approaching the prostate was not materially different from that employed by most surgeons when using the permeal route, in fact, after reading Young's description, he did not see anything in his method of approaching the prostate which could be claimed as new or original. So far as opening the capsule parallel to the urethra or transversely to the urrethra was concerned, it was a matter of election or convenience in particular cases. Personally, he had opened the capsule trans versely rather than longutudinally, but not across the mid line. However, if he had found it facilitated the enucleation by making it in a longutudinal direction, he would have done it. His rule had been of late not to pack the capsule after removing the gland but to suture it. He had brought the walls together by catgut sutures, and by doing this the period of convalescence was shortened.

Another point which he considered of importance was to get these old people up as quickly as possible after the operation Old people did not bear the bed very well after operations. He therefore removed the perineal drainage very early and got the patient up. He had found the convalescence was much short ened in this way not only so far as the patient's general health was concerned, but the perineal wound closed more quickly.

DR E WYLLYS ANDREWS did not think that Young himself

claimed as his the incision used by Dr. Frank, as credit for it belonged to Zuckerkandl. He agreed with Dr. Frank about the general improvement after prostatectomy. He had seen one or two old men who had had their testes removed, and one or two upon whom he had performed prostatectomy, who afterwards appeared to him to be ten years younger, in that the wrinkles disappeared from their faces, and they grew less sallow and withered or senile looking.

Dr. L. L. McArthur had had a fæcal fistula after a prostatic extirpation in one instance, and he thought caution might be well taken against the vigorous use of the median posterior retractor, in that it might cause a rectal perforation. He recalled a case in which it was easy to separate the rectum, and feel it fall back perfectly intact, and after the extirpation of the prostate, during which time the posterior retractor was used vigorously. when about to close the wound a small fistula was found riding astride the coccyx which had an unusually sharp anterior curve. The posterior retractor pulling on the coccyx tore a hole through and weakened the anterior rectal wall in that way. It had not gone through the posterior wall, but the anterior wall had been perforated. So caution should be used after the rectum had been demonstrated to be perfectly separated from the prostatic capsule to protect it against the action of the retractor faultily used.

Dr. Frank, in closing the discussion, said he did not claim anything new in the technique he had described; nor did he say that it was Young's method, but rather Young's technique. He had read the literature thoroughly, and he did not recall any one in this country or any other country who had described so nicely and so minutely what was being done. Out of ten surgeons who were doing prostatectomy, he ventured to say that six of them did not know what they were handling until they reached the prostate. They would tear around until they felt a hard mass, and then try to remove it. Personally, he liked to see every piece of tissue he was handling, and he was quite sure Dr. Andrews would not attempt to do one of his herniotomies without seeing every tissue he handled; consequently, he believed that surgeons were justified in doing prostatectomy upon the same principles and with the same technique as they endeavored to carry out in other operations on the human body. He

had seen prostatectomies, and he had done them, where every-body around was amazed at the flow of blood It was unnecessary to transfuse patients if the technique of Young was fol-lowed With this technique everything was under control of the eye, and one need not be afraid of a secondary hamorrhage. He called anything surgery that one could see, and when he could detect every fibre and tissue he was working on He did not call it surgery to take a kmfe in hand, jab it into the tissues, and then work in the dark, not knowing what he was feeling No operation had pleased him more than when he did an opera-tion on this case, because he had everything before his eyes clean down to the prostatic urethra

He did not say anything about getting the patient up, but desired to say now that this patient was sitting up in bed on the second day. In the case of old men it was better to get them up as early as possible. He believed that this was generally accepted by all surgeons, that the earlier old men were gotten up the better it was for them

GALL-BLADDER AND BILIARY DUCT SURGERY

DR. D A K STEELE read a paper with the above title, for which see page 201

DR A J OCHSNER said there was no doubt whatever but what in the vast majority of all patients suffering from gall stones, cholecystitis, or disease of the ducts, there was a time when the condition could be safely and permanently relieved by an operation, and that the serious conditions which the essayist had emphasized were the result of late conditions A cholecys tectomy would have to be made very seldom if an operation were done early A choledochotomy would have to be performed probably never in case an operation were performed at the best possible time Perforation of the gall bladder, of course, would not occur Peritonitis would not occur, so that whenever surgeons had an opportunity of impressing the internist with this fact, he thought they should do it He thought also it should be done by securing the attendance of the internist at the operation, so by securing the advantance of the interinst at the operation, so that he can really see what was the matter inside of a patient, what the condition in the gall bladder and in the ducts was at the time of the operation. If the internist saw enough of these cases, he would soon learn not only to make a diagnosis of gall-stones, but he would learn to advise early operation. Even then it was not possible, because many of these patients would refuse operation, though urged by a man to submit to operation who had the conviction of a surgeon, so that it could not always be done. But the difficulty in these cases was this, that the majority of patients coming under the surgeon's care suffering from gall-stones had suffered previously from a diagnosis of gastritis. If there had not been the misfortune of this diagnosis having been made, the patient might have been relieved, but having had a diagnosis of gastritis or gastralgia made, the patient would continue to suffer from gall-stones because of the fact that he had been treated for the wrong condition.

In many cases suffering from cholecystitis, with the presence of gall-stones or sand in the gall-bladder, he had found the usual stomach symptoms, and upon examining the patient had found that the tenderness was to the left of the median line, while in a case of gastric ulcer, the greatest point of tenderness was usually exactly at the median line, although, in case the ulcer was in the greater curvature, or in the cardiac end of the stomach, then this was not strictly true. Now and then there might be vomiting of blood; there might have been blood in the stools; but the tenderness was to the left of the median line, so that a diagnosis of gall-stones was made. The typical point of tenderness between the end of the ninth rib and the umbilicus was also present; but upon opening the abdomen it would be found that the duodenum at its upper end was greatly distended, and that the pylorus was wide open. In cases of gastric ulcer the pylorus was closed, as a rule. When one lifted up the transverse colon and examined the small intestine, the jejunum, where it passes through the mesentery of the transverse colon, was contracted. It was empty, while the duodenum was open. Enlarged glands were found along the duodenum. This could only be explained in this manner, that there was a physiological obstruction opposite the entrance to the common duct into the duodenum, and for that reason the duodenum was distended with gas above and was closed lower down. In a large majority of these cases he had found either gall-stones or sand in the gallbladder. Furthermore, in many of these cases he had found pancreatitis, due to physiological closure at a point behind the

stomach a little below the entrance of the common duct. He would like to have other surgeons observe this condition in operating, namely, whether in many of their cases they find a dilated duodenium, a wide open pylorus and a contracted jejinnum down below.

DR D N EISENDRATH said the more he saw of gall stone cases, the more impressed was he that surgeons were apt to for get the complications on the part of the liver itself. In a paper read by him three years ago, to which the essayist had referred. he investigated, made sections, and cultures of a case that was operated upon by Dr Greensfelder at the Michael Reese Hospital In this case he found scarcely any of the liver cells stained, prac-tically nothing but the inner third around the central vein. If one investigated the liver in cases of cholecystitis and gall stones, varying degrees of liver necrosis as a result of infective cholan geitis would be found, where there was an associated cholan geitis, with or without pus formation the more he was impressed in almost every case of gall stones, in which there had been any perceptible degree of infection in the way of elevation of tem perature, or chills, or leucocytosis, that there was considerable change in the liver parenchyma. How did this affect the prognosis? The liver was scarcely able, after a gall stone opera tion, to excrete the normal amount of bile it was not able to get rid of the many foreign substances which it ought to do conse quently there was that much more work thrown on the kidneys and frequently after gall stone operations patients became cholæmic. He saw a case recently of that kind The patient became unconscious, began to vomit, and to have high temperature and died within three or four weeks. These patients sometimes died from cholæmic symptoms sometimes from symptoms of uræmia in addition to cholæmia, the cause of the uræmia being, in all probability, due to the fact that the kidneys are temporarily over worked by having too much excrementatious material thrown upon them

DR M L HARRIS stated that since the surgeon had taken these cases under treatment, our ideas concerning gall-stones had materially changed. He would only mention a few points. First, gall stones were always preceded by infection. They were due to infection. Gall-stones were therefore a secondary condition of the infection. He believed the infection, contrary to the gen-

erally accepted idea, was a descending infection. It was not due to the ascending infection, that is, organisms passing from the intestine up the bile duct, but due to a descending infection. The microbes were eliminated by the liver, and these gained access to the biliary passages.

Infection being the primary and chief condition, the surgeon operated to relieve or cure the infection. Gall-stones never gave rise to any trouble until they migrated or became restless. Every operation, therefore, should be accompanied or followed by drainage of the gall-tracts. The gall-tracts should be drained until the flow of bile was sterile. If one would make daily cultures of these infected bile-tracts, he would find that he would be able to obtain a culture up to a certain point and then fail. This is the only scientific time when drainage should be discontinued. Practically, it had been found that the bile would become sterile on an average in from ten days to two weeks; but one should continue drainage until he was no longer able to obtain a culture from the escaping bile.

Dr. Jacob Frank reported a case of infection of the liver. Recently he operated upon a patient for multiple abscess of the liver following appendicitis. Six weeks after the operation for appendicitis there was fever and other symptoms, and he suspected an abscess of the under or upper surface of the liver. On opening the abdomen, he took a culture from the gall-bladder, then punctured the liver, and took cultures from it. In the fluid, however, there were a few small flakes that did not look natural, but he did not know what they were. The patient died; a postmortem examination was made, and multiple abscesses of the liver were found. The bile from the gall-bladder was sterile. He simply wished to ask this question. Why was the bile sterile in this case, and why was there not a descending infection? The aspirations taken from the liver were not sterile.

Dr. E. Wyllys Andrews believed that surgeons had overestimated postoperative drainage as a curative measure. A statement of this kind as to the curative value of drainage was useful to surgeons in the class of cases on which they operated under mistaken diagnoses, and not having found any gall-stones, they could fall back on the theory of giving benefit to the patient by drainage. This was liable to be fallacious in his opinion, because it held a half truth. It was impossible to over-estimate the value of restoring the dramage of the gall tracts in a case of obstruction per vias naturales, but if this natural tract drainage was restored, he was rather disposed to think, the more he save of gall tract work, that external drainage was needed only to save the peritoneum. It was known that a patient who had an obstructed deep duct and external drainage was secured alone, was only temporarily releved, and after a moderate length of time would die of mantion if all the bile escaped from the fistula. In certain recent cases he had observed, instead of a marked and direct improvement following drainage, although jaundice was gotten rid of, there was slow exhaustion. Death did not always occur from peritonitis, uramia, or from cholaemia, but from marasmis. He did not see how gall stone surgery could help any patient except by removing mechanical obstruction to the flow of bile. It did not follow from that, however, that we did not need drainage, but we did, because it was a mechanical necessity after these incussions for a short time.

As to the remarks of Dr Harris, that daily examinations would show less and less number or virulence of the microorganisms, if it was true, as shown by Futterer, that the normal gall tracts physiologically contained living micro organisms which were excreted by the liver and sent out through the intestines, he did not see that the point was of any particular value. In the last year he had come to look upon cholecystectomy as of less value than formerly. It might be he had over-estimated cholecystectomy in connection with gall stone work, and possibly there were surgeons who were disposed to remove gall bladder in a routine way the same as the appendix. Cholecystectomy was indicated in a certain class of cases, but in other classes of cases where the surgeon was in doubt as to whether or not to do it, it had been a distinct disappointment.

DR STEELE, in closing the discussion, stated he had limited what he had to say to certain phases of the subject, and had then cited a few cases showing the had results of late operations, and urging upon the Fellows the necessity of early operation Although surgeons recognized the necessity of early operation in these cases, it was difficult to convince the general practitioner of its importance, even after early diagnoses were made. As the Transactions of the Society were read by a large number of general practitioners, he hoped the discussion would be of service

in helping them to make earlier diagnoses and refering their cases to surgeons for early operation.

There were many moot points connected with the subject of surgery of the bile-tract. He was familiar with the experiments that were made by Fütterer some years ago, showing the rapidity with which micro-organisms, when introduced into the blood, were found in the bile and passing down into the intestines; yet his personal experience had been so strongly along the lines indicated by Dr. Harris, he thought patients were not safe until bile became sterile, and he therefore drained every case,—at least, he drained more now than he used to do in these cases. Formerly, it was thought the ideal method was to close the gall-bladder after the removal of the gall-stones, but those patients did not do as well as those patients that were now treated by drainage. Where we had a dilated and infected common duct, or where we had gross pathological changes in late cases, drainage was absolutely essential, and must be continued for a longer time; and if one attempted to close the gall-bladder, as was done in the earlier operations, the patients would not do as well as they would where external drainage of the infected bile was resorted to, and drainage of a portion of the infected bile down into the duodenum.

TO CONTRIBUTORS AND SUBSCRIBERS.

All Contributions for Publication, Books for Review, and Exchanges should be sent to the Editorial Office, 386 Grand Ave., Brooklyn, N. Y.

Remittance for Subscriptions and Advertising and all business communications should be addressed to the

ANNALS OF SURGERY, 227-231 South Sixth Street, Philadelphia.

Awarded
GOLD MEDAL
Louisiana
Purchase
Exposition

The Stendard Antiseptic

LISTERINE

Awarded

GOLD MEDAL

Louisiana

Purchase

Exposition

A non toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution sightly, pleasant, and sufficiently power ful for all purposes of asepsis these are advantages which Listerine embodies

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine

LISTERINE DERMATIC SOAP

An entiseptic detergent for use in the antiseptic treatment of diseases of the akin.

Listerine "Dermatic" Soap contains the essential antiseptic constituents of eucalyptus (1%), mentha, gaultheria, and thyme (each ½%), which enter into the composition of the well known antiseptic preparation, Listerine, while the quality of excellence of the soap stock employed as the vehicle for this medication will be readily apparent when used upon the most delicate skin and upon the soalp Listerine "Dermatic' Soap contains no animal fats, and none but the very best vegetable oils, after its manufacture, and before it is "imilled' and pressed into cakes, a high percentage of an emolletin oil is incorporated with the soap, and the smooth, elastic condition of the skin secured by using Listerine "Dermatic" Soap, and as the antiseptic constituents of Listerine are added to the soap after it has received its surplus of unsaponfied emollent oil, they retain their peculiar antiseptic virtues and fragrance

Awarded 60LD MEDAL Louisiana Purchase

Frposition

A sample of Listerine Dermatic Scap may be had apon application to the Manafacturers—

Lambert Pharmacal Company, St. Louis, V. S. A. Awarded
GOLD MEDAL
Louisiana
Purchase
Exposition

Cattell

First edition exhausted in six months Second revised and enlarged edition

Just Issued

Post-Mortem Pathology

By HENRY W. CATTELL, A.M., M.D.

Sometime Director of the Josephine M. Ayer Clinical Laboratory of the Pennsylvania Hospital; Pathologist to the Philadelphia Hospital; Senior Coroner's Physician of Philadelphia; Pathologist to the Presbyterian Hospital; Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania.

Octavo. 464 pages. 183 illustrations. Cloth, \$3.00.

R. CATTELL, whose name is already well known to our readers as one of the editors of the English translation of Ziegler's work on General and Special Pathology, has in 'Post-Mortem Pathology' written an excellent guide to the proper carrying out of post-mortem examina-This volume will prove to be a most useful reference book on matters connected with every branch of the subject; where description fails to convey the meaning of some manipulations, excellent illustrations make matters quite clear. There is no doubt that many practitioners feel the want of some such aid, for in the past we fear our own curriculum of medical education has been defective in not insisting upon closer attention to such matters. To English as well as American readers this volume will be of service in this direction, and considerable help will be found in the chapter dealing with difficult questions of medicolegal character. Dr. Cattell's great experience in pathological inquiries gives him the right to produce a work of this kind, and, as might be surmised, there is little room for criticism of the statements made, though the reader may disagree with some of the methods recommended—as, per example, the method of opening the skull-such differences are of minor importance. After discussing the choice of instruments and the design of post-mortem rooms and refrigerator apparatus, the account is given of the various pathological appearances met with in various systems in different diseases. Special guidance will be found for the examination of children, and for what are called restricted post-morten examinations.

"Harkes's method for securing a view of the nasopharnyx by median section of the skull after the calvarium has been removed is described, and a useful account is given of the methods to be adopted for preserving bodies for subsequent examinations and embalming. Amongst other general information will be found an account of the methods to be adopted to fix permanently the colors of the tissues in museum specimens (Kaiserling), of the early diagnosis of rabies by the method—elaborated by Babes, Van Gehuchten, and Nelis, and of Uhlenhuth's precipitin test for human blood. The volume closes with a useful analysis of the various modes of death which occur in different diseases."—British Medical Journal, October 15, 1904.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

Spalteholz and Barker

Just Issued

Atlas of Human Anatomy

B₁ WERNER SPALTEHOLZ

Extraordinary Professor of Anatomy in the Laurersity and Custodian of the

EDITED AND TRANSLATED PROV THE THIRD CERMAN EDITION By LEWELLYS I BARKER M.B. Tor Professor of Anatomy University of Chicago WITH A PREFACE

By FRANKLIN P MALL

Professor of Austomy 11 the Johns Hopkins Un vers ty Baltimore

872 pages 935 illustrations, mostly in colors 3 volumes Square Octavo Cloth \$10 00 per set

OR convenience this atlas is divided into three volumes

Vor.

I -BONES, JOINTS, LIGAMENTS VOL II - REGIONS, MUSCLES FASCIÆ HEART, BLOOD VESSELS

VOL III - VISCERA, BRAIN, NERVES, SEYSE ORGANS

Pictures of dissections true to nature, aid the imagination, refresh the momory, and act as an excellent guide in the practical work of the physician and surgion. In this atlas the illustrations are typical, and give all the stages of a dissection of a body from its beginning to its completion

This work is intended to embrace the entire descriptive anatomy, with the exception of histology, and is likewise to have due regard for the field which like

between microscopic and macroscopic anatom; proper

The topographic relations of the organs, and especially of the vessels and survey, have been given the utmost consideration obtainable within the compass of a book which treats primarily of descriptive anatomy. When objects have appeared difficult from a teaching standpoint, many drawings were made from every possible view point

The text gives a clear description of the figure, and it is much more defailed than is really necessary in an atlas in which the illustrations are the essential, yet it resembles many text books in completeness. For showing the soft parts

the material was all carefully hardened in formalin

Notwithstanding the enormous cost of production, the price has been kept down to a figure that places this sumptuous work within the reach of every practitioner and student The majority of the illustrations are from original drawings by the well known anat mucal artist, Bruno Heroux

The book speaks for itself, must be seen to be appreciated, and when once -cen, will be universally hailed as one of the finest anatomical atlases ever placed upon the market

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

The Diseases of Society

(The Vice and Crime Problem)

BY G. FRANK LYDSTON, M.D.

Illustrated. 8vo. Cloth, \$3.00, net. Postage, 17 cents extra

THE most direct, forceful, and out-spoken study of social conditions in this country which has yet been put into print. Dr. Lydston considers not only the police criminal, the anarchist, and the sexual pervert, but also that vast number of offenders against the moral and physical laws whom the courts cannot reach. He deals with the oppression of wealth, the rights and wrongs of organized capital and labor, the negro question and the crimes which have grown out of it, and with the offences of "society" at large. His book is written in the most trenchant and brilliant His statements cut to the bone; he tells the truth without fear or favor. As a physician, physiologist, and student of social conditions, he has had wide experience for many years.

6

CONTENTS

CHAPTER

- I. Social Pathology.
- The Principles of Evolution in their Relations to Criminal Sociology and Anthropology, and to Social Diseases in General.
- III The Etiology of Social Diseases in General, with Especial Reference to Crime.
- IV Neuroses in their Relations to Social Diseases—
 Brain Development—Insanity—The Criminal Skull—Epilepsy—Hysteria—Sulcide.
 - V The Chemistry of Social Diseases—Toxemia in its Relations to Vice and Crime—Alcoholism, Narcotic Inebriety, and Auto-Intoxication.
- VI. Anarchy in its Relations to Crime.

CHAPTER

- VII. Sexual Vice and Crime.
- VIII. Sexual Vice and Crime (continued) Satyriasis and Nymphomania—Sexual Psychopathy.
- IX. The Race Problem in its Relation to Sexual Vice and Crime.
- X. The Treatment of Sexual Vice and Crime,
- XI. Genius and Degeneracy.
- XII. Physical and Psychic Characteristics of the
- XIII. Illustrative Crania and Physiognomies of Degenerates—Types of Criminals.
- XIV The Therapeutics of Social Disease in General, with Especial Reference to Crime.



PUBLISHED BY

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

To Physicians and Surgeons:

WE have just issued a new and revised Catalogue of our Medical and Surgical Publications, which we will be pleased to forward free of expense to all physicians and surgeons requesting same. As a guide to the latest and most approved books on Medical and Surgical Science, it will be found of especial interest and value to all members of the profession.

J. B. LIPPINCOTT COMPANY

The MIDLAND ROUTE



BETWEEN -

Denver, Cripple Creek,

Leadville, Glenwood,

and Salt Lake City is

THE PEER OF SCENIC ROADS

BEST EQUIPMENT—FINEST ROADBED

P S —Send for illustrated booklet on Colorado as a health and pleasure resort to

C H SPEERS Cen Past Agt DENVER

THE FEBRUARY NUMBER OF

Lippincott's Magazine

WILL KEEP ITS PROMISE FOR THE NEW YEAR AND OFFER RELAXATION FOR THE OVERWORKED AND ENTERTAINMENT FOR THE IDLE

THE LEADING FEATURE WILL BE:

"A Transaction in Rubies"

BY FREDERIC REDDALE

THIS IS A NOVELETTE WHICH WILL ALLOW NO READER TO SKIP OR IGNORE IT. IT IS AN INSISTENT TALE OF STOLEN RUBIES, WITH A TERMINATION WHICH HAS NEVER BEFORE APPEARED IN FICTION; NOVEL, REAL, POSSIBLE, YET FASCINATING BEYOND BELIEF.

THE SHORT STORIES ARE GOING TO BE VARIED BUT NEVER DULL. THEY ARE:

"The Siege" A REALISTIC LOVE EPISODE OF THE MANCHURIAN WAR
BY WILL LEVINGTON COMFORT

"The Real Margaret" REAL LIFE DONE INTO ROMANCE

BY INA BREVOORT ROBERTS

"The Shrewdness of Hawkins"

CITY CONDITIONS DONE INTO FICTION THAT BITES

BY ARTHUR HENDRICK VANDENBERG

"The Other One" THE HUMOR OF EVERYDAY LIFE

BY VINCENT HARPER

"And Mande" A BITTER-SWEET SKETCH OF CERTAIN SOCIAL FAILINGS

BY ANNE WARNER

THE PAPERS UP-TO-DATE WILL BE:

- "The Use of Plants for Table Decoration" BY EBEN E. REXFORD
- "An Alpine Morning" BY DR. CHARLES C. ABBOTT
- "Miss or Mistress?" BY PROF. ALBERT SCHINZ, OF BRYN MAWR COLLEGE
 - THE POEMS WILL REPRESENT AMERICAN VERSE AT ITS BEST, AND "WALNUTS AND WINE" WILL NOT FLAG IN MIRTH
- 25 Cents a Copy.

\$2.50 a Year.

REMEMBER

THAT IN ADDITION TO "LIPPINCOTT'S MAGAZINE" AND OUR BOOK PUBLICATIONS

WE DO

IN OUR ENORMOUS PLANT



THE FINEST COMMERCIAL AND PRIVATE PRINTING

AND THAT OUR WORK IS

ORIGINAL AND TELLING

UNIQUE BOOKLETS AND CATALOGUES
GENEALOGICAL, MEMORIAL, AND ALL OTHER
PRIVATELY ISSUED BOOKS
JOURNALS, MAGAZINES
TRANSACTIONS OF LEARNED SOCIETIES
LAWYERS' BRIEFS
HIGH CLASS OFFICE STATIONERY
ARTISTIC FOLDERS AND PAMPHLETS

ALL OUR WORK IS INDIVIDUAL WHAT WE DO FOR YOU WILL BE DIFFERENT FROM WHAT WE DO FOR ANYONE ELSE. ASK US FOR THAT MUCH PRAISED BOOKLET, 'THE LONGEST LIVED ADVENTISEMENT. AND 'ZERO WEATHER



J. B. LIPPINCOTT COMPANY

EAST WASHINGTON SQUARE, PHILADELPHIA

THE WASHINGTON SOUARE PRESS

STUBBORN ULCERS TIELD TO ALPHOZONE

The difficulty of successfully treating chronic ulcers—particularly varicose ulcers—makes this application of Alphozone of much importance.

Numerous reports have recently been received showing that Alphozone is an agent of peculiar efficiency, immediately checking pus formation and bringing about healthy granulation resulting in prompt healing of the sore.

We quote from a prominent Maine physician's letter, just at hand:

"I cannot speak too highly of Alphozone in treatment of varicose ulcer."
"I apply pure powdered Alphozone daily for two or three days, then a mixture of equal parts Alphozone and boric acid every other day until cured."

"The first application is somewhat painful—naturally—but after that it is not. The ulcer heals in two weeks easily."

Equally good results are had in the treatment of corneal ulcers, and we anticipate an extensive use of Alphozone in this direction.

Alphozone is a definite chemical compound—succinic dioxide—freely soluble in water, permanent, and having the highest germicidal power of any non-toxic substance.

We have published an interesting brochure treating of the chemistry, bacteriology and therapy of Alphozone, which we send with a sample of the product to any physician requesting it.

STEARNS E CO. DETROIT, MICH. U. S.A. WINDSOR, ONT: LONDON, ENG. NEW YORK. CITY.



St. Winifred's Hospital, 1025 Suffer Street

SAN FRANCISCO, CALIFORNIA

A New FIRE-PROOF Hospital

with Fifty Sunny Rooms Centrally located The most Modern Operating Rooms in the West. A Private Sans torium for Medical and Surgical Cases WINSLOW ANDERSON MD MRCP Lend Medical Director

Sunshine

happiness and health vear round EURÉKA – SPRINGS. ARK Curative and palatable waters, pure, dry, pine-laden mountain air, clear, bright weather

MEAN TEMPERATURE

Spring months 61 degrees Summer " 74 Fall ς8 Winter " 43

Excellent Hotels--Beautiful Surroundings

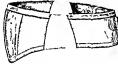
One Night from St Louis Write for The Summit of the Ozarks



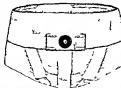
PERRY GRIFFIN 111 South Ninth Street Phi adelphia, Pa.

401 BROADWAY NEW YORK

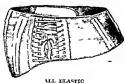
FOR EVERY CONDITION REQUIRING SUPPORTING BELTS ABDOMINAL BUPFORT the Pomeroy Company are "Made to Fit"



CLOTH FABRIC



COMBINATION BELT AND TRUSS





MADE AND FITTED BY

POMEROY COMPANY 17 Union Square, New York 414-416 Fultan St , Brooklyn When writing please mention Annals or Sungery

Bureau of Health Chemists Endorses Bailey's Pure Whiskey



To the testimony of some of the best known physicians of Philadelphia, and that of nurses whose professional duties demand that they occasionally use a pure whiskey, comes the following remarkable endorsement from Doctor William C. Robinson, chemist of the Philadelphia Bureau of Health:

I have tested five quarts of whiskey labelled "Bailey's Rye Whiskey," taken in sealed bottles by me from the stock exposed for sale at your store, 1209 Market Street, by six different methods, including three well known ones (the Miller, the Resorcinol, and the Phloroglucin). In all the samples, and by all the methods, the results were negative. In other words, I found these whiskies to be free from adulteration and all foreign and injurious admixtures.

The same chemist analyzed our wines, and found them free from all adulterations or preservatives.

An analysis of the whiskey was also made some years ago by

the Franklin Institute, when its absolute purity was pronounced.

SPECIAL OFFER TO PHYSICIANS AND NURSES.

In order to give professional practitioners the opportunity of observing the excellent quality of Bailey's Pure Rye for themselves, we will send to any address one gallon of the \$1.50 per quart whiskey (the famous Yellow Label) for \$4.00—a discount of 33% per cent. On all orders after that we will allow a 10 per cent. discount. This is open only to physicians and nurses, for home or professional use.

Write for copies of analysis, etc.

HUEY & CHRIST

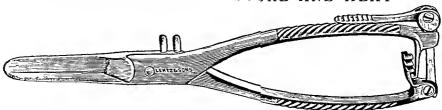
1209 Market Street

PHILADELPHIA

Surgery Without Ligatures

DOWNES' ELECTRO-THERMIC ANGIOTRIBE

HÆMOSTASIS BY PRESSURE AND HEAT



Four Styles of Forceps, three straight blades, ¼, ¾, and ½ inch wide, and curved blade ¾ inch wide.

Over 600 major abdominal operations performed without secondary hemorrhage.

Forty leading American surgeons are now using them. Write for reprints and circulars.

CHARLES LENTZ & SONS

Manufacturers of Surgical Instruments

18 and 20 North Eleventh St.

Philadelphia

ORDER THE AMBULATORY Adjustable to Recumbert or Ambulatory T cannot of

Hip Femur Leg Patella, Ankie; Lases Now Union; knee and Hip-se RECOMMENDIT TO YOUR FATIENTS Good Resul's Count Write Us Telegraph ders Gven Frompt Attention Respectfully AMBULATORY PHEUMATIC SPLINT MFG CO 169 E Randolph Street CHICAGO

A NEW THERAPEUTIC AGENT OF VALUE IN THE TREATMENT OF EPILEPSY, WITH THE REPORT OF A CASE

Hugo Enchsen, MD, LRCP and S. reports an interesting case in the Medical 4ge for September 25, 1904 The author says -

regular intervals owing to the fact that his stomach was easily deranged Eventually they had to be rejected. Even bromide of sodium proved objectionable for this reason

' Ahout this time my attention was di rected to "Brometone" It proved to be the very thing I was looking for, as the patient had no difficulty in retaining it and it did not give rise to untoward after effects taking what was evidently an overdose the patient experienced drowsiness during the day, but when the dose was reduced to 5 grains (in capsules), three or four times a dsy, he bad no further trouble in this respect

"Brometone contains shout 77 per cent of bromine and possesses the redative and other characteristic effects of that agent is preferable to the bromides, because it does not excite nausea vomiting or alimentary disturbance Moreover, it does not seem to produce the undesirable systemic depression often resulting from the older bromides Although my patient has been taking Brome tone day after day for over a year, he has not been afflicted with skin rashes or any other indications of bromism Furthermore, he has not had an attack for stateen monthe has gained in weight amproved in appear ance and takes a more cheerful view of the future

"From my experience with it I am in clined to believe that Brometone will prove of service in the treatment of other nervous conditions, particularly insomnia, headache, and deligum tremens. It may also prove of benefit in some cases of asthma and may reeve cough of reflex nervous origin "

LA GRIPPE AND ITS SEQUELÆ AGAIN PREVALENT

The following suggestions for the treat ment of La Grippe will not be amies at this time when there seems to be a prevalence of at and its allied complaints. The patient is usually seen when the fever is present, as the chill, which occasionally ushers in the disease, has generally passed away First of all, the bowels should be opened freely by some saline draught. For the severe head ache, pain and general soreness give an antikamma tablet with a little whiskey or wine, or if the pain is very severe two tab lets should be given Repeat every two or three hours as required Often a single dose re followed with almost complete relief If. after the fever has subsided the pain mus cular screness and nervousness continue the most desirable medicine to relieve these and to meet the indication for a tonic, are anti-Lamnia and quinine tablets One tablet three or four times a day will usually an awer every purpose until health is restored



FREE Catalogue F.

THE 20TH CENTURY POLYCLINIC TABLE Manufactured by

THE PERFECTION CHAIR CO Ind anapolis Ind

The WALKEASY ARTIFICIAL LEG

Our Art Catalog contains valuable informa-tion on Care and Treatment of Stump Prepara-tory to applying an Art Limb How Soon to Apply Art Limbs for Children Directions for Sell Measurement, atc. etc.

GEORGE R FULLER CO ROCHESTER, N Y Branches, Chicago, Ballale, Bestel, Philadelphia

SAL HEPATICA.

Effervescent une seld solvent and eliminator atimulates liver tones all intestinal glands pu rifies alimentary tract and improves digestion essimilation and metaboham It is practically specific in rheumatism gout and billons attacks Sal Hepatica has no equal for eliminating toxic products from in testical tract or blood and correcting victous functions clogged Write for free sample BRISTOL MYERS CO



REDUCED TO THREE DOLLARS A YEAR.

JOURNAL OF THE Association of Military Surgeons of the United States.

The only Journal devoted to the Military Aspects of Wedicine, Surgery and Hygiene in the United States.

Announcement.

Original Articles.

The Journal will, in each number, continue the publication of original papers of the high order which has hitherto characterized the work of the Association. Arrangements have been made for important memoirs relative to the medico-military conduct of campaigns in all lands and by all nations.

Reprints and Translations.

The medico-military literature of other countries will be freely laid under contribution, and all important articles in contemporary literature will be drawn upon.

Medico=Military Index.

All articles in current literature pertaining to military medicine, surgery and hygiene, not republished will be promptly reported.

Editorial Department.

An accomplished corps of collaborators will cooperate with the editor in presenting timely discussions, reviews, comments, and general information relative to current events of medico-military interest.

Typography and Illustration.

The Journal will continue to be printed in the best style upon heavy supercalendared paper and fine illustrations will continue to be freely employed whenever possible to elucidate the text by their use.

Subscription, Three Dollars a Year in Advance.

Free to members of the Association of Military Surgeons of the United States

Association of Military Surgeons,

Carlisle, - - Pennsylvania.

REDUCED TO THREE DOLLARS A YEAR.

KRESS & OWEN vs CRUTTENDEN

On the 8th day of December, Police Mag istrate Denison, in the Police Court, regis tered a conviction against Thos Cruttenden, Jr , who keeps two drug stores in Toronto, one at the corner of Howard and Sher bourne Streets, and the other at the corner of Gerrard and Sumach Streets, for infringement of the trade mark, duly registered in Canada, owned by Kress & Owen Co., 210 Fulton Street, New York, "Glyco Thymo lene" The evidence conclusively showed that the defendant had put up a preparation under the name of "Glyco-Thymol," in bottles almost identical to those of Kress & Owen Co, and with labels worded terbatim et literatum to those of the original manu facturers The magistrate, in registering the conviction, gave the defendant's solicitor, who hinted at an appeal, to understand that if he entertained that idea, he would not only fine hut imprison his client, as the law provided The case was adjourned for a week, at the end of which time Cruttenden, through his solicitor, gave an undertaking that he would stop all manufacture of Glyco-Thymol and destroy all labels, bottles, etc., connected with the sale of that preparation



THE HIGH PRESSURE TYPE

Too mu h work Too little recreation In ac ive physical hab its Result—Verves, Insomnia, and Im pending Collapse

Goldbeck's Malt Extract

aids the digest on, quiets the strained nerves, and imparts placidity of disposition

By prescribing Goldbeck's

you ensure the patient's co operation—this prepara tion being agre able to the most fastidious taste

Especially useful to Nurs

JOHN F. BETZ & SON. Limited

sale of that preparation | Crown and Callowhi 1 Street: PHILADELPHIA PA

The Medical Department of the UNIVERSITY OF THE SOUTH

A College Association, Graded, Graduating Summer School of Medicine, situated on the Cumberland Plateau, at Senance, Tennessee 2000 feet above sea level, will open its thirteenth course of lectures on April 1, 1903, and close the succeeding October

Four courses of lectures will be required before graduation, with legal intervals when four

sculities adequate laboratory and medical knowledge at reasonable

For catalogues and information address,

J. S. CAIN, M.D., Dean, Sewance, Tenn

Dry Secretions.

Respiton COMPELS the ELIMINATING organs to on their normal duty, hence the remedy for Fevers, Colds, Bronchitis, Pracumonla and all Pathological Conditions with dry skin and dry secretions

Respiton represents the medical properties of Ascieplas and Berberts. Dose, teaspoonful every two or three hours, or less often, as Indicated.

Dad Chemical Company, . . New York and Paris,



ADVANCED METHOD OF REMOVING GERMS AND DUST FROM RAIL WAY CARS

method may be of interest to our readers.

The old method of car cleaning with a which here and a dash there with a broom

HE LIE CAL CITIES BY GOOD OF WINGOW the foot of the hove is a metal pipe with a f which he duet "draw

away The encount amounth of 4

through two dust separators, the first of which clears the air of 90 per cent of the

method of car cleaning and the Vacuum System, while reducing disease liabilities to a minimum, at the same time reduces the cost of cleaning and time consumed. Two cars can be thoroughly cleaned under the new system at the same expense of time and money as was formerly consumed in cleaming

MISS L. M. HERR Artist

3804 Locust Street, Philadelphia, Pa

Drawings of medical and surgical subjects in black and colors Physicians work a specialty

Sent Under a Guarantee C The HYGIENIC

PERFECTION MATTRESS



Delivered anywhere in the United States

5,000 on use and everyone giving entire sfaction Blade in one continuous but Will never become lumpy or packed is dust and ver min proof and is renovated by sunning

OUR GUARANTEE

Sleep on it sixty nights and if you are not thoroughly satisfied—if it is not super or to any \$30.00 hair mettress in cleanliness com fort and duras my return it and get your



THE HYGIENIC PERFECTION MATTRESS

It Cannot Fail to Give Entire Satisfaction. PERFECTION MATTRESS Co., Birmingham Ala

Yours truly
A B CURRY Pastor Second Presbyterian Church, Mem

WRITE TODAY FOR FREE LITERATURE. ADDRESS

PERFECTION MATTRESS CO. 227 21st Street N Birminghem, Ala

EUCAIN LACTATE.

BY PROF. A. LANGGAARD, BERLIN.

Abstracted from the Therap. Monatshefte, Aug., 1904.

For the production of anesthesia of mucous membranes an efficient substitute for cocain is much needed; concentrated cocain solutions, such as must be employed for this purpose, are very toxic, and in many cases the constringent action of the drug interferes with the operation and is responsible for secondary hemorrhage. Eucain hydrochlorate, which is only one-fourth as toxic, does not produce ischæmia, shrinkage, or after-bleedings; but it has the drawback of being only $3\frac{1}{2}$ to 4 per cent. water-soluble, and, while this is amply sufficient for ordinary purposes, it does not suffice for operations of the nose, throat, and ear.

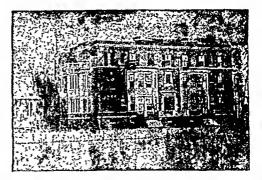
The new salt of eucain, however,—Eucain Lactate,—is water-soluble to the extent of 25 per cent., and possesses all the advantages of the hydrochlorate, so that it is well adapted for use in rhinology, otology, and laryngology in 10 to 15 per cent. strengths.

Eucain Lactate is a white, non-hygroscopic powder melting at 155° C. 119 parts of it contain as much eucain base as 100 parts of the hydrochlorate. Solutions are non-irritant; even 5 per cent. strengths cause no irritation in rabbits' eyes. It produces no hyperæmia, ischæmia, or shrinkage. It has been highly praised by Prof. Katz for the anesthetization of the mucous membrane, and it may be used for infiltration and regional anesthesia as well.

THE RESPIRATORY LINK.

The truth of the old adage that a "chain is only as strong as its weakest link" is forcibly illustrated in medicine. The constitution of a patient may in most of its relations be normal; yet the chain of health is impaired by one function which is the seat of more or less constantly recurring disturbances.

The most frequent form of this weak physiologic link that confronts the physician is that manifested by the patient who, with the advent of winter, suffers from repeated congestions and inflammations of the respiratory organs. It may be that at all other times of the year the individual is, as far as indications go, in a good state of general health; it is, however, more commonly the



SARAH LEIGH HOSPITAL Norfolk, VA.

A new, thoroughly up-to-date private hospital. Rooms single or *en suite*. Private Baths. Quiet surroundings. Salubrious Climate. Especially for Surgical, Gynecological and Rest Cure Cases. A few Medical cases taken.

Correspondence with physicians invited. Address one of the following:

DR. SOUTHGATE LEIGH, SURGEON IN CHARGE DR. STANLEY H. GRAVES, ASSOCIATE, MISS M. A. NEWTON, SUPERINTENDENT.

case that the skilled diagnostician is able to recognize an impairment of constitutional vigor, which is in reality the cause of the respiratory disturbances. Present-day scientific teaching emphasizes that it is unwise to treat these patients with expectorants, cough syrups and respiratory sedatives; these latter remedies are at the best but palliative and do not reach the cause of the disturbance. It is more rational to endeavor to strengthen this weak respiratory link by restoring its integrity, and the proper way to do this is by treatment directed to the real causative factor, which is an atonic condition of the system.

The effect of Gray's Tonic in these cases is upon the local disturbances of the respiratory mucous membrane—it has a direct antiphlogistic and tonic influence upon the disordered circulation; it thereby relieves engorgement and restores tone to the relaxed blood vessels.

Gray's Tonic is to be preferred in the management of these acute and chronic respiratory conditions, because it gives the patient RELIEF from the very start, and if persisted in, overcomes the condition completely. It strengthens not only the weak respiratory link, but also the entire chain of constitutional vigor.

LIGNOL in Surgery

Powerful Non Caustic Antiseptic

NATURAL OIL

Fistulas Skin Diseases

The most perfect lubricant for Sounda and Speculums

A trial of this Natural Oil will demon strate its usefulness Literature and samples promptly furnished on application

LIGNOL SOAP

Antisephe Superfatted Dermetological Soap

Vakes the most efficient the most
readily used also the cheanest douche

for the treatment of Leucorrhoea.

THE GIRARD COMPANY, Inc.

Pharmaceutical Chemists
1305 Samom Street Philadelphia Pa

A Plain Statement of Important Facts

THE medical profession has been consistently cautioned by Fond a Extract Company as to the danger of purchasing and prescribing commercial witch hazel which has no standard of purity and quality

In substantiation and further pursuit of these efforts to protect physician and patient alike it is now announced that within the last two months secretly samples of which hard have been purebased. From as many wholease and restd Gealen in the counsercial article in six of the largest oftics of the Unifed States and flast, on screpulous invesingation by the most reputable analytical that the secret is not aligned to the counteringation by the most reputable analytical that summer principle disposed word alreado or formalishingle or both while grain alcoholwar jound to fortify only efficiency.

In the face of auch permicious conditions it must be obvious that in all cases in while hamamelis is indicated only a standardized product of invertable purity quality and strength—like Pond s Extract of Hamels—must be safely prescribed and used

GENITO-URINARY IRRIGATION BASIN

DESIGNED BY DR J B CARNETT PHILA P.

Price, \$7.00 each

THE VALZAHN CO.

PHILADELPHIA SURGICAL INSTRUMENT HOUSE

132 South Eleventh Street
PHILADELPHIA PA

FOR MALE PATIENTS

This basin is constructed of nickel-plated copper and readily contains two quarts of solution

Its shape is shown by the illustration

It is so constructed as to rest comfortably between the patient's legs and is self-supporting, by means of two wide flanges, which rest across the front of the thighs

It is designed especially for office work of the physician and for those cases in which the patient himself carries out a prolonged course of irrigation



An antiseptic in surgery, that destroys and prevents the growth of bacteria, is

Phénol Sodique

—antiseptic, hemostatic, prophylactic, and anodyne surgical dressing for cuts, burns, sores, bruises, and inflammation.

. May save operations by prescribing

"SOLULES"

Ergaloids

for Amenorrhea, Dysmenorrhea, and irregular menstruation. Happy and pleasant combination. Easy to take.

Samples and literature upon request. Mention this Journal.

HANCE BROTHERS @ WHITE

PHARMACEUTICAL CHEMISTS

Philadelphia

New York

Chicago



SNELL AMERICAN CYSTOSCOPE.

COLD LAMP -- WATER OR AIR DILATATION -- DIRECT VISION.

IN THIS INSTRUMENT ARE COMBINED

The successful features of all other American or European instruments constructed for bladder inspection or ureter catheterization, together with the following seven additional important advantages:

First.—BOTH ureters can be catheterized at the same operation through one and the same catheter chamber.

Second.—One third larger field of vision is obtained than with any other double catheterizing cystoscope of SAME outside caliber.

Third.—We give you the same size field of vision as other double catheterizing cystoscopes, but with the SNELL AMERICAN instrument of five sizes smaller caliber.

Fourth.—You can use either WATER OR AIR DILATION easily and successfully with the same instrument.

Fifth—An achromatic lens system giving a large and magnified field without reflexes or rainbow hues.

Sixth.—After BOTH ureters have been catheterized and catheters are entirely outside of cystoscope (see technique) you can examine both ureters and ascertain positively by seeing whether catheters are still in the ureters or not.

Seventh.—The most important and incalculable advantage is that when cystoscope is withdrawn from bladder and urethra, THE CATHETERS ARE NOT WITH-DRAWN (as is generally the case with all other instruments).

These seven very important features are the result of over one hundred actual demonstrations on living subjects, demonstrations which have been made with and for a large number of the most prominent surgeons in the United States, and if you are thinking of purchasing a cystoscope, you cannot afford to consider any instrument which does not give you these advantages.

Manufactured solely by CHICAGO ELECTRO APPLIANCE CO. 67 Wabash Avenue, Corner Randolph Street, Chicago, Ill.

When writing, please mention Annals of Surgery.



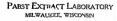
WINTER STORMS

Strength and vitality are required to wear through severe weather. Strength and vitality must be rallied against the storms of Influenza and Pneumonia.

Pabst Extract

is a stimulant always to be depended on while the storm is being faced, and a nutrient of highest value as well. And when the long after-period of low vitality is to be endured, it puts heart and hope into the exhausted fighter.

This Malt Extract huilds steadily, replaces losses, and holds all gains strongly and surely.



For Subacute and Chronic Inflammation

(Especially of the vagina or urethra) the most satisfactory results follow the use of



It is always convenient, easy of application, comforting to the patient, effective as a deodorant, absolutely to be relied upon as a powerful, non-poisonous germicide and antiseptic, with local anæsthetic properties in the treatment of severe cuts, wounds, burns, etc. **SULPHO-NAPTHOL** has immense advantages over carbolic acid, in that it may be used with freedom in all the natural cavities of the body.

WE WILL GLADLY SEND SAMPLE AND LITERATURE TO ANY PHYSICIAN MENTIONING THIS JOURNAL

THE SULPHO-NAPTHOL CO.,
46 HAYMARKET SQUARE, - BOSTON, MASS.

MEXICO

A WINTER TRIP

To the most marvellously picturesque country under the sun

THREE THROUGH TRAINS TO DAILY

ST. LOUIS, MO. to MEXICO CITY

Via Iron Mountain Lines and Laredo and Via M. K. & T., S. P. Co., and Eagle Pass.

Trains from New Orleans connect with these three "Flyers" at San Antonio, Tex.

Exclusive Through Pullman Service
Via "Laredo Route" and "Eagle Pass Route."
THE SHORTEST LINES.

MEXICO CITY IS 11 HOURS NEARER UNDER NEW FASTER SCHEDULE

NATIONAL RAILROAD OF MEXICO.

MEXICAN INTERNATIONAL RAILROAD.

INTEROCEANIC RAILWAY OF MEXICO.

JACKSON SMITH

General Passenger Agent, Mexico City, Mexico

W. F. PATON

General Eastern Agent, 11 Broadway, New York.



THE

"Colorado Short Line,"

...DIRECT TO...

Glenwood Springs, Colorado Springs, Manitou

Famous Resorts & Rockies.

Elegant Puliman Sleeping Cars, Observation Parior Cafe Dining Cars, with Electric Lights and Pans, and Free Recibing Chair Cars.

W. E. HOYT, G. E. P. Agt., 335 Broadway, N.Y.



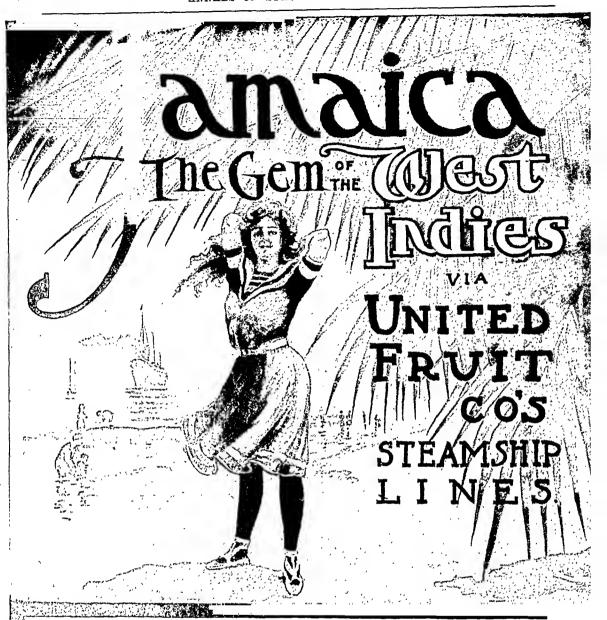
shows it with needle and pistonrod attached. This ready-to-use

serum-syringe is the perfection of safety and convenience.

(Sulle of 500, 1000, 1000, 2009 and 4000 units.)

SPECIFY "P., D. & CO." WHEN ORDERING.

L. Louis, Bruton, Baltimers, New Orleans, 441, Qua., Sydney, N.S.W., St. Principus



JAMAICA

WHERE SUMMER IS 12 MONTHS LONG

An increasing number of tourists and health seekers who wish to escape the harsh Northern Winter are yearly choosing Jamaica. Its gentle climate, gorgeous tropical scenery, outdoor recreations and splendid hotel accommodations offer unusual inducements to the sojourner.

Nowhere can winter be spent so delightfully

THE UNITED FRUIT COMPANY'S Steel, Twin-Screw U. S. Mail Steamships

ADMIRAL DEWEY ADMIRAL SAMPSON

ADMIRAL SCHLEY ADMIRAL FARRAGUT

sail weekly from Boston and Philadelphia, Steamships BROOKLINE and BARNSTABLE weekly from Baltimore. The passage down the coast is the favorite short ocean voyage.

Round Trip Fare, \$75 {including meals} Single Fare, \$40

Write for Jamaica literature describing and illustrating the Island and tours of interest.

Address Division Passenger Agent,

United Fruit Company, Long Wharf, Boston; 5 North Wharves, Philadelphia; Hughes & Henry Sts., Baltimore
Raymond & Whiteomb Co.
Thos. Cook & Son, Tourist Agents

He Has Two Good Legs

One made by NATURE, the other by MARKS READ WHAT HE SAYS



FRANK FAUST Po

This demonstrates that a man may lose a leg in an accident and yet fire a locomobve

A treatise and measuring about sent gratis. Address

A. A. MARKS, 701 Broadway, N. Y.

Received the Grand Prize for Artificial Limbs at the World's Fair St Louis



When writing pease mention by the or Sun Far

, s end

- 4

The advent of the season in which

COUGH, BRONCHITIS, ASTHMA, WHOOPING COUGH, Etc.

Impose a tax upon the resources of every physician renders it opportune to re-invite attention to the fact that the remedy which invariably effects the immediate relief of these disturbances, the remedy which unbiased observers assert affords the most rational means of treatment, the remedy which bears with distinction the most exacting comparisons, the remedy which occupies the most exalted position in the esteem of discriminating therapeutists is

GLYCO-HEROIN (Smith)

GLYCO-HEROIN (Smith) is conspicuously valuable in the treatment of Pneumonia, Phthisis, and Chronic Affections of the Lungs, for the reason that it is more prompt and decided in effect than either codeine or morphine, and its prolonged use neither leaves undesirable after-effects nor begets the drug habit. It acts as a reparative in an unsurpassable manner.

DOSE.—The adult dose is one teaspoonful, repeated every two hours, or at longer intervals, as the case may require
To children of 10 or more years, give from a quarter to

To children of 10 or more years, give from a quarter to a half teaspoonful To children of three or more years, give five to ten drops MARTIN H. SMITH CO.

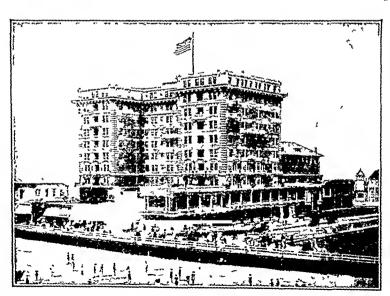
PROPRIETORS,

New York, N: Y.

Samples supplied, carriage paid, upon request

CHALFONTE

ATLANTIC CITY, NEW JERSEY



This new Fireproof Structure was opened July 2, 1904, after the expenditure of over \$600,000.00 for improven ents.

Special provision has been made in it for those seeking rest and recuperation at the seashore. It is different in many respects from other resort houses, but especially so in the increased amount of space devoted to the public and the variety and excellence of the table.

The patronage and favorable influence of the Medical Profession is solicited.

CHALFONTE 1. Always Open.

THE LEEDS COMPANY

ON THE BEACH Atlantic City, N. J

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic, Antiseptic and Styptic. The application of Orthoform to wounds of whatever character relieves pain for hours, frequently days. Also itching and pain of Pruritis, Eczema, Laryngeal Tuberculosis, Otitis, Conjunctivitis, etc.

Used as sprinkling Powder, Insufflation, Emulsion or Ointment.

Literature on application to

VICTOR KOECHL ® CO.



No matter how much one might feel inclined to pay, there is nothing better to be had.

Those who wear it are best qualified to arrive at a true estimate of its real value which may be made in the following way.



Fill in your own figures and you will find that you cannot afford to be without the Dr Deimel Underwear

A few suits will give you a chance to verify your estimate
All Dr. Deimel Garments bear the Dr. De tiel name

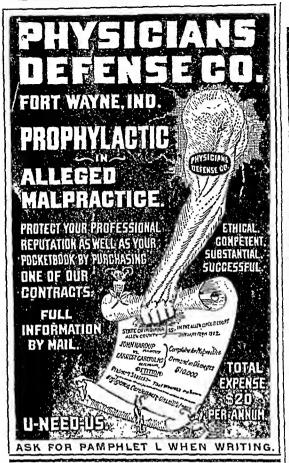
All Dr. Depnel Garments bear the Dr. De toel name For sale at the best Dealers everywhere For Booklet Samples and Full Information Address

THE DEIMEL LINEN-MESH COMPANY
491 BROADWAY, NEW YORH

SAN FRANCISCO WASHINGTON BROOKLIN BALTIVORE MONTREAL

ê

.



DR. BROUGHTON'S

Sanitarium

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to

R. BROUGHTON, M.D. ROCKFORD, ILL.

BOLK Sawed By LEG 21 EN

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

see that the name R. L. POLK & CO.
IS ON THE ORDER BEFORE YOU
SIGN IT.

POLK'S is the only complete Medical Directory.
POLK'S is the only Medical Directory having an index to all physicians in the United States.

POLK'S has stood the crucial test of time with increasing popularity. It thoroughly covers the field.

L. POLK & CO., Publishers,

SUBSCRIBE NOW.

QUILTED Mattress Pads

N acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in confort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

COLLARGOLUM (Soluble metallic saver)

UNGUENTUM CREDÉ

tious processes. Clinical experience (15% Collargolum Ointment) recorded in a literature of over 150 reports shows their efficacy and harmlessness

CREOSOTAL-HEYDEN DUOTAL-HEYDEN

Bland carbonates of the caustic creosote and guaiacol. Even 11/2-dram doses are well borne. Hundreds of

check beginning sepses and are power-

ful weapons even in desperate infec-

publications evidence their value in phthisis, pneumonia, typhoid fever, bronchitis, etc.

ORPHOL

(Betanaphtol Bismuth-Heyden)

The astringent antiseptic par excellence in all enteric fermentative processes. Innocuous, inodorous, tasteless. It rapidly eliminates the toxalbumins and soothes inflamed mucous membranes.

Literature supplied by

SCHERING & GLATZ, New York

CHICAGO

ROENTGEN X-RAY

LABORATORY

6000 Skingraphs taken within past six years

SEND for book containing Skingraphs of Tumers Cysts and I lood Clots in the Brun Renal, Vencal, and Bilary Car-culi Decases of Lungs Cavi Phth us etc. Diseases of Heart, Ancorisms, Percer with effus on Floating Fractures, Dislocations
Deformines of the Hip, Sp
and other parts of the body

Established May, 1896 for Medical Disguesis

W. C. FUCHS 406-407-408 Schiller Bldg

103-109 Randolch St. CHICAGO

Telephone Central 1744





\$1.00 BOTTLE FOR TRIAL

If you have not been so favored, send to our Department A, enclosing 25 cents for packing and postage.

Mew Wealamd is different

A LAND of astounding contrasts in both scenery and inhabitants. Where, within a day's journey of each other, are the sombre grandeur of Norwegian fjords and peaceful beauty of the Irish lakes. Volcanoes in eruption, glaciers and geysers. Mountain scenery unsurpassed by Switzerland. The land of the Maoris where civilization and savagery touch elbows as nowhere else on earth. The one corner of creation which should not be left unvisited.



American and Australian Line

Offers a luxurious passenger service between San Francisco, Hawaii, Samoa, Tahiti, New Zealand and Australia Around the World. Send 15 cents postage for handsome New Zealand book. Illustrated folder free.

J. D. SPRECKELS @ BROTHERS CO., General Agents,

648 Market Street, San Francisco

E. F. BURNETT, General Eastern Agent,

429 Broadway, N. Y.

Nature's method of providing against the admission of septic matter is by plastic infiltration, then follows an

Effort to wash out the offending matter by an exudation of serum

To obstruct this wise system by the use of escharotic antiseptics, acts to

Produce conditions which have the effect of

delaying

Resolution

Glyco-Thymoline Aids nature in her pro

cess of repair maintaining the fibrin in soluble form stimu lating capillary circulation fostering and sustaining cell growth resulting in the rapid formation of healthy granulations A practical dressing for all wounds burns and ulcerated conditions

SAMPLES AND LITERATURE IF YOU MENTION THIS JOURNAL

KRESS @ OWEN CO. 210 Fulton Street

New York

LIGNOL in Surgery

Powerful Non Caustic Antiseptic

NATURAL OIL

Fistulas Skin Duseases

The most perfect submeant for Sounds

and Speculums

A trial of this Natural Oil will demon strate its usefulness Literature and samples promptly fur nished on application.

LIGNOL SOAP

Antiseptic Superfatted Dermatological Soap Makes the most efficient, the most readily used also the cheapest douchefor the treatment of Leucorrhoea

THE GIRARD COMPANY, Inc. Pharmaceutical Chemists

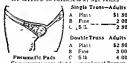
1308 Sansom Street

Philadelphia Pa

FLAVELL'S SUPERIOR APPLIANCES

ELASTIC TRUSSES

CAN BE WORN DAY AND NIGHT ARE OFFERED TO PHASICIANS AT NET PRICES



2 30 Double Truss Adults Plat t \$2.50 Fine 3 00 S lk 4 00

\$1.30

2 00

Give circumterence of and men on I ne of Rupture State if for Right or Left

ELASTIC STOCKINGS G ve exact Circumference and Length in all cases



RELIABLE GOODS ONLY

G. W. Flavell & Bro. 1005 Spring Garden St Philadelphia Pa

A Profitable Investment

A SMALL AMOUNT OF Schwahn Reduction Company's stock, left unsold from its first allotment of 250,000 shares, is offered for subscription. There are 50,000 shares of stock to sell. The par value is \$1.00 full paid and non-assessable. These shares are offered at 50 cents per share, and will continue to be offered until the entire block is sold. The proceeds are used exclusively for the completing of the Company's works at Belleville, Ill.

The Schwahn Reduction Company (Incorporated) does a general manufacturing of Chemical Products pertaining to Aluminum, and will produce Metallic Aluminum and its Alloys and Products thereof. The manufacture of the Sulphate of Aluminum, the material from which the metal is produced, will be in full operation on a commercial scale from December 1, 1904, guaranteeing by its extensive use for many industrial and domestic purposes a handsome Dividend from the start. This is a conservative and strictly safe investment. The manufacture and the profits are based on valuable patents in the United States and abroad, permitting operation at a cost of at least fifty per cent. less than heretofore possible.

Write for prospectus and descriptive literature. Some of this literature will greatly interest physicians without a view to investments. Correspondence invited on this subject.

THE SCHWAHN REDUCTION COMPANY

601 Fullerton Building St. Louis, Mo.

From the Engineering and Mining Journal, November 10, 1904.

"The Schwahn Reduction Company, of St. Louis, has an exhibit in the Mines and Metallurgy Building at the World's Fair, designed for the purpose of bringing to the public notice the process of producing aluminum by a pyro-chemical reaction, or the 'Schwahn Process,' patented in the United States, Germany, and elsewhere. By this process the aluminum is reduced by means of heat and reducing gases from Sulphate of Aluminum, which may be produced from common clay, such as kaolinite, by the 'Schwahn process for preparing aluminum sulphate,' also patented. These processes are demonstrated and shown in this exhibit by numerous displays of the intermediary stages, beginning with the clay and ending with the final product—the metallic aluminum—thereby furnishing the proof of success. It is claimed the 'Schwahn Process' makes aluminum at such a cheapening of cost and purity that it will stimulate the consumption of the metal, and allow its use for many purposes which the hitherto high price has made prohibitory."

Awarded a Metal Prize at World's Fair, 1904.

DEFENSE

OF MALPRACTICE

SUITS IS GOOD

But the Busy Doctor also wants

PROTECTION

The Fidelity and Casualty Company of New York

Defends its clients against any such Proceedings at its Own Cost, and if Damages are awarded will PAY them.

Special Accident and Health Insurance for Physicians, Surgeons, Dentists, etc.

Kutnow's EFFERVESCENT Powder

"The Practitioner," England, says -

March, 1904

"This preparation possesses a pleasant taste
It is a very pleasant form of laxative medicine acting
if taken in hot water before breakfast, on an empty
stomach in the space of about one hour Kutnow's
Powder will be found most useful by sufferers from
hemorrhoids astitisgentle in its effects while relieving
the loaded portal system by its hydragogue action

Especially valuable for Surgeons after operations to overcome the nausea after the anesthesia and

to coax the per-

istaltic action



LAWSON TAIT

Removes Con stipation, Indiges tion Biliousness and is most use ful in all derange ments of the Stomach, Liver, and Kidneys

SAMPLES SENT FREE TO PHYSICIANS

APPLICATION FORM

A COCK TOLL

OF KUTNOW S POWDER

To suy Member of the Medical Profession

Appress____

Kutnow Bros., Ltd.,

Annals of Surgery

853 Broadway, New York, U. S A 41 Farringdon Road, London, Eng

BOOKS FOR SURGEONS

- BERRY.—A Manual of Surgical Diagnosis. By JAMES BERRY, M.B., B.S., F.R.C.S. 12mo; 363 pages. Cloth, \$2.00 net.
 - The Thyroid Gland; Its Diseases and Their Treatment. By JAMES BERRY, M.B., B.S., F.R.C.S. 121 Illustrations, from Original Photographs of Cases. Cloth, \$4.00 net.
- Burrell and Blake.—Case Teaching in Surgery. Containing complete clinical histories and physical examinations of 75 actual cases, serving as a basis for exercises in diagnosis, prognosis, and treatment. By Herbert L. Burrell, M.D., and John Bapst Blake, M.D. 12mo. Cloth, \$.75 net.
- BUTLIN.—The Operative Surgery of Malignant Diseases. By HENRY T. BUTLIN, F.R.C.S. Second Edition, Revised and Rewritten. Illustrated. Octavo. Cloth, \$4.50 net.
- Deaver.—Surgical Anatomy. A Treatise on Human Anatomy in its Application to the Practice of Medicine and Surgery. By John B. Deaver, M.D. With 499 very handsome Full-page Illustrations, engraved from original drawings, made by special artists, from dissections prepared for the purpose in the dissecting rooms of the University of Pennsylvania. Three large volumes. Royal Square Octavo. Sold by Subscription, complete sets only. Half Morocco or Sheep, \$30.00; Half Russia, \$33.00 net.
 - Surgical Anatomy of the Head and Neck. By JOHN B. DEAVER, M.D. With 177 Full-page Plates, nearly all of which have been drawn from Special Dissections. One Royal Square Octavo volume. Half Morocco, \$12.00 net.
- DOUGLAS.—Surgical Diseases of the Abdomen. With Special Reference to Diagnosis. By RICHARD DOUGLAS, M.D. 20 Full-page Plates. Octavo; 833 pages. Cloth, \$7.00; Sheep, \$8.00 net.
- JACOBSON.—The Operations of Surgery. By W. H. A. JACOBSON, F.R.C.S., and F. J. STEWARD, F.R.C.S. Fourth Edition, Revised and Enlarged. 550 Illustrations. Two volumes. Octavo. 1524 pages. Cloth, \$10.00; Leather, \$12.00 net.
- KEAY.—Gall-Stones: Their Medical Treatment. By J. H. KEAY, M.A., M.D. 12mo. Cloth, \$1.25 net.
- Kehr.—Diagnosis of Gall-Stone Disease. Including 100 Clinical and Operative Cases illustrating Diagnostic Points of the Different Forms of the Disease. By Prof. Dr. Hans Kehr, of Halberstadt. Authorized translation by William Wotkyns Seymour, A.B., M.D. 12mo; 370 pages. Cloth, \$2.50 net.
- LEES.—Acute Visceral Inflammations: Their Treatment. By D. B. LEES, M.A., M.D., F.R.C.P. 12mo. Cloth, \$1.50 net.
- MAYLARD.—The Surgery of the Alimentary Canal. By ALFRED ERNEST MAYLARD, M.B., B.S. Second Edition. 97 Illustrations. Octavo. Cloth, \$3.00 net.
- Morris.—Textbook of Anatomy. A Complete Textbook. Edited by Henry Morris, F.R.C.S. Third Edition, Revised and Improved. One handsome octavo volume, with 846 Illustrations, of which 267 are printed in colors. Thumb Index and Colored Illustrations in all copies. Cloth, \$6.00; Leather, \$7.00 net.
- Moullin.—Enlargement of the Prostate: Its Treatment and Radical Cure. By C. W. Mansell Moullin, M.A., M.D., F.R.C.S. Illustrated. Third Edition, Enlarged. Octavo. Cloth, \$1.75 net.
- ROLLESTON.—Clinical Lectures and Essays on Abdominal and Other Subjects. By H. D. ROLLESTON, M.A., M.D., F.R.C.P. Octavo. Cloth, \$1.50 net.
- Voswinkel.—Surgical Nursing. By Bertha M. Voswinkel. Second Edition, Revised and Enlarged. 111 Illustrations. 12mo. Cloth, \$1.00 net.
- Walsham.—Surgery: Its Theory and Practice. By Wm. J. Walsham, M.D., F.R.C.S. 8th Edition, Revised and Enlarged, by Walter George Spencer, M.B., F.R.C.S. 8vo; 1227 pages. 622 Illustrations, including 20 Skiagrams. Cloth, \$4.50 net.
- WRIGHT AND PRESTON.—Handbook of Surgical Anatomy. By G. A. WRIGHT, B.A., M.B., F.R.C.S., and C. H. PRESTON, M.D., B.S., F.R.C.S., L.D.S. 12mo. Cloth, \$1.50 net.

Complete Descriptions sent Free upon Request to the Publishers.

P. BLAKISTON'S SON & COMPANY

1012 WALNUT STREET

PHILADELPHIA

PNEUMONIA PLEURISY AND BRONCHITIS

Under the old modes of treatment the death rate from pneumonia was phe nomenally high—too high

Some will die under any treatment, but those who are using

ANTIPHLOGISTINE

in treating their pneumonia patients find that many apparently hopeless cases recover

Most physicians now freely acknowledge that Antiphlogistine is fir better than ice packs blisters counter irritants or poulines of any kind. Through a uniform degree of heat and moisture, long and continuously maintained aided by a per sistent hygroscopic effect, Antiphlogistine tends strongly in the direction of flushing the capillaries. The relief of the pulmonary congestion and the overworked heart is further encouraged by Antiphlogistine's action upon the nerve terminals, resulting in a dilation of the superficial vessels and the contraction of those deeply seated.

Once you have used Antiphlogistine on yourself your wife or your child, you will ever after appreciate its efficacy

Follow Directions Carefully

Directions for Applying in Pneumonia — Prepare the patient in a warm room Lay him on his side and spread Antiphlogistine thick and as hot as can be borne one half the thorace walls — Cover with a good, warm, cotton lined cheese cloth jacket — Roll the patient over on dressed side and complete the application. Then stitch the front of the yecket — Prepare everything beforehand and work as rapidly as possible — The dressing should be renewed when it can be easily peeled off, generally in about 24 hours.

The semiless air tight original container of Antiphlogistine not only insures its delivery in perfect condition but is economical for the patient, therefore, always order an original package and specify the size required—Small Medium, Large or Hospital Size

(Never sold in bulk)

THE DENVER CHEMICAL MFG. CO. NEW YORK.

STOVAINE

A New Local Anaesthetic

I desire to direct the attention of the Profession to descriptive literature from the pens of

Dr. P. RECLUS,

Dr. Fourneau,

Dr. Huchard, Dr. M. Chaput,

Dr. N. Nogue, Dr. Pont,

Dr. F. Billon, Dr. L. Launoy, Dr. G. Pouchet,

Dr. F. Lapersonne, Dr. E. Sauvez,

Dr. L. Kendirdjy, Dr. R. Bertaux,

which will be sent upon request.

STOVAINE is a new Synthetic Anaesthetic, derived from certain amino alcohols having the certain amino alcohols having the property of tertiary alcohols, discovered by Dr. Fourneau, and prepared in the laboratories of

LES ETABLISSEMENTS POULENC FRÈRES, PARIS.

WALTER F. SYKES

SOLE UNITED STATES AGENT

85 WATER STREET, - - NEW YORK

396 Atlantic Ave. BOSTON

184 Washington St. CHICAGO

132 Chestnut St. PHILADELPHIA

EUSOMA

(Echinacea Compound.)

A Perfect, Non-Poisonous, Antiseptic and Alterative for both Internal and External Administration. & &

A NATURAL AMERICAN REMEDY FOR THE AMERICAN PHYSICIAN

Not Controlled by any Foreign Chemical House.

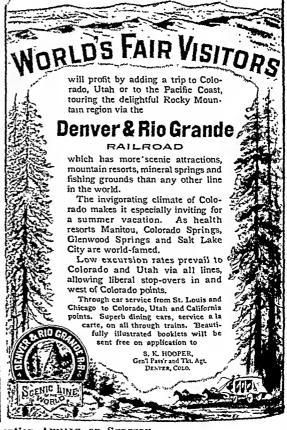
CLEAN WOUNDS always heal without suppuration and INFECTED WOUNDS quickly become CLEAN WOUNDS when EUSONA is used as a dressing.

All septic conditions are promptly and favorably influenced by the internal ad-ininistration of EUSOMA, which has well been termed the "great corrector of blood dyscrasia."

This coord does not permit using it in his to the the appear to the two profit values III SOMA, but our beoklet giving EXACT formula and full description of the remedy will be sent to physicians upon application—also sample, postpaid, for the asking.

The EUSOMA PHARMAGEUTICAL Co. CINCINNATI, OHIO.

U. S. A.





The Winkley Artificial Limb Co.

(Incorporated under the Laws of the State of Minnesota,)

JEPSON BROS., Sole Owners.

LARGEST MANUFACTORY OF ARTIFICIAL LEGS IN THE WORLD.

MANUFACTURERS OF THE

LATEST IMPROVED, PATENT ADJUST-ABLE, DOUBLE SLIP SOCKET

Artificial Leg

(Warranted NOT to Chafe the Stump.)

With SPONGE RUBBER, FOOT.
Mexican Felt or English Willow

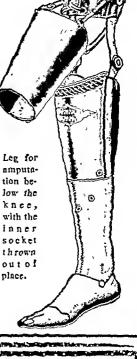
PERFECT FIT GUARANTEED

From Casts and Measurements WITHOUT Leaving Home

Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN.

U. S. A.



THE ONE REMEDY

which experience proves is free from detrimental effects is

GRAY'S Glycerine TONIC Comp.

Try it in convalescence, respiratory disorders, anaemia, malnutrition, nervous exhaustion.

THE PURDUE FREDERICK CO.,

298 Broadway, New York

${ m A}$ nnals of ${ m S}$ urgery

Vol XLI

MARCH, 1905

No 3

ORIGINAL MEMOIRS.

THE DIAGNOSIS AND TREATMENT OF FRACT-URE OF THE CARPAL SCAPHOID AND DIS-LOCATION OF THE SEMILUNAR BONE,

WITH A REPORT OF THIRTY CASES

BY ERNEST AMORY CODMAN, M D.

OF BOSTON, MASS

Surgeon to Out Patients Massachusetts General Hosp tal

AND

HENRY MELVILLE CHASE, M D, OF BOSTON, MASS

It is proposed to consider the subjects included in the title of this paper under the following heads

I, Introduction II, Development of the Carpal Bones III, Symptoms of Simple Fracture of the Scaphoid Bone IV, Diagnosis V, Use of the X-ray in Diagnosis VI, Treatment of the Fractires of the Scaphoid VII, Report of Cases The remarks upon these groups constitute the present paper. In a second paper will be presented, I, Dislocation of the Semilunar Bone II, Symptoms III, Treatment IV, Report of Cases V, Résumé of Literature of Carpal Injuries in General VI, Diagnosis and Treatment VII, Report of Cases VIII, Conclusions IX, Bibliography

321

PART I.

INTRODUCTION.

The first case of simple fracture of the scaphoid bone of the wrist in which I was able to make a diagnosis was that of J. G. (Case I), which is herewith reported. For the privilege of reporting this case, as well as several others, I am indebted to Dr. Franklin G. Balch, in whose Clinic at the Massachusetts General Hospital J. G. was treated. In this instance the diagnosis was considered a simple sprain, but the continued symptoms led us at length to examine the wrist with the fluoroscope, and the fracture was then easily recognized. During the next four years occasional examples of this lesion presented themselves at the Clinic, but it was not until a private case (Case V) came to me in December, 1901, that I fully appreciated the importance of this fracture. The failure of rest, time, massage, and, finally, of forcible manipulation to restore the perfect functions of this young man's wrist, has led me to study with great care all the other cases of carpal injuries which I have met in my hospital work. As a result of this study, I now recommend excision of one or both portions of the broken scaphoid. The cases herewith reported have nearly all been at my own Out-Patient Clinic; but for a few I am indebted to my colleagues, who, knowing my interest in injuries to the wrist, have referred them to me. Besides the cases here reported, there have been many others which I have seen once or twice and which help to form the experience on which this paper is based. Dr. Chase and I have, however, felt that partial reports of such cases would be superfluous, because the ultimate results have not been observed or because the X-rays have been obscure and doubtful. We have, therefore, selected those cases to report which we have in most instances been able to observe for some months or years after their original injury.

My interest in this subject is also greatly quickened by a friendly discussion with Professor Thomas Dwight, in which a radical difference of opinion has arisen as to the nature of these fractures of the scaphoid My views have been based on my clinical and X ray experience, and I consider these lesions as entirely due to trauma acting on normal bones I explain the non union by the anatomical situation of the bone, which allows the fractured surface to be persistently bathed in syno vial fluid, and by the lack of proper and continued fixation immediately after the injury Professor Dwight looking at the subject from a developmental and anatomical point of view explains these lesions as instances of bipartite centres of ossi fication which never unite by a true bony union and thus are easily separated by violence In an address to the Massachu setts Medical Society, his words, referring to certain anomalies in the formation of bones, are as follows "This naturally suggests the burning question of fracture of the scaphoid bone of the wrist, which I think no one had ever heard of before the X-ray Now it occurs all the time My friend Dr Codman was kind enough a while ago to show me a room full of patients with fractured scaphoids at the Massachusetts General Hospital, and yet I still believe that, putting aside extraor dinary cases of injury, a normal scaphoid is never broken, and that the separation into two parts which undoubtedly occurs, is the result of violence acting on a hone composed of two pieces united merely by cartilage This also I hope before long to establish" Certain bipartite scaphoids which Professor Dwight finds in the dissecting room, he considers as examples of such faults of development, while from my point of view they are merely instances of the fairly common lesion of fracture of the scaphoid (Plate IV, Fig 12)

In following up this subject, another lesion of the wrist of slightly less frequent occurrence has been met with, and it has seemed to us necessary to include this with simple fracture as it sometimes accompanies it. We have, therefore, included isolocation of the semilunar bone under the scope of this paper, particularly since a method of reduction devised by one of us in pursuance of some anatomical studies of the normal motions of the wrist joint, has been used with signal success in three cases.

During our study of these two typical lesions, i.e., simple fracture of the scaphoid and dislocation of the semilunar bone, we have met with a few other instances of fractures of the small bones of the carpus; but, since they were extremely rare, we have left them out of the discussion, feeling that it is more important to call the attention of the profession to these two more common lesions, which are really so often met with that they should be borne in mind by every practitioner, and are by no means to be considered as curiosities.

That error in the diagnosis and treatment of these injuries is frequent is well illustrated by four articles which have appeared in this Journal during the last four years. I refer to those by Bolton, Stimson, Hessert, and Ely, criticism of whose papers, except that by Bolton, will be found in the footnotes in Part II under names of Stimson, Hessert, and Ely.

In Bolton's case, as in the others, the error is one of interpretation of the skiagraph, which shows, in addition to the obvious dislocation of the semilunar, a coincident fracture of the scaphoid bone. (E. A. C.)

DEVELOPMENT OF THE CARPAL BONES.

It is not our intention to enter into the discussion of the detailed comparative anatomy or embryological history of the centres of ossification of the carpal bones, but we feel that a brief mention of the theory of Pfitzner is important in giving a fair presentation of our views on the relative frequency of fracture of the scaphoid and of a congenital bipartite condition of this bone. Pfitzner, having studied the types of arrangement of the carpal bones in the lower animals, has elaborated the following typical scheme of the probable centres of ossification, the fusion or coalescence of which forms the variations in different species. This scheme conceives the formation of cartilaginous centres, twenty-four in number, which represent the possible number of carpal bones which may develop through the independent ossification of each centre. Variations from this type are caused by disappearance of certain centres, by absorption, by absence of ossification, and by fusion or

coalescence of the different elements. This may be more clearly appreciated by reference to the accompanying dia grams of Pfitzner (p 326), which represent the cartilaginous centres of the possible bones of the carpus and suggest two interesting considerations.

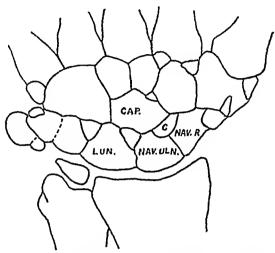
First, an arrangement roughly into five rows suggests its homologous relation to its ancestral types, second, the number of centres represent the possible number of the adult carpal bones, some of which, as a rule, disappear, and do not continue development to ossification, while others either coalesce and form a process or continue an independent existence as a separate bone

The ages at which the centres of ossification of the carpal bones appear have been recorded by Debierre as follows

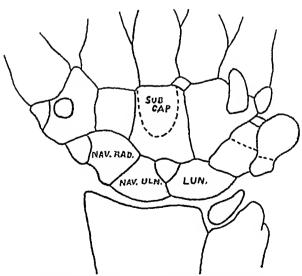
Os magnum, 11 to 12 months, unctform, 12 to 14 months, cuneiform, 3 years, semilunar, 5 to 6 years, trape zum, 6 years, scaphoid, 8 years, trapezoid, 6 to 7 years, pisiform, 10 to 13 years. But these have been found to occur somewhat earlier since the use of the X ray, and both observations suggest that we must not expect fracture to show in early life.

Pfitzner emphasizes the rationality of his theory by show ing several instances of variation in which a single centre of ossification is found in each of three specimens, either as a distinct bone or coalesced to one of its adjacent carpal bones forming a bone process. He stated also that, although he had never seen a separate centre for a bone which he called the subcapitatium (marked Subcap on the diagram), he never theless was firmly convinced that it must exist in harmony with the rationality of his theory and practically proven scheme of the development of carpal bones. This great anatomist died without ever having seen this one separate bone, the subcapitatium, which he prophesied must exist. He described the subcapitatium as lying on the palmar side of the hand between the trapezoid and the unciform bones, synostosed with the distal portion of the os magnum and articulating with the third metacarpal. This bone was first recognized and beautifully

demonstrated by Professor Thomas Dwight in both hands of a white man aged fifty-four years, thus adding another con-



Pfitzner's diagram. Dorsal view. NAV. R., Navicular Radiale. NAV. ULN., Navicular Ulnare. C., Centrale. LUN., Lunatum. CAP., Capitatum.



Pfitzner's diagram. Ventral view. NAV. RAD., Navicular Radiale. NAV. ULN., Navicular Ulnare. LUN., Lunatum. SUBCAP., Subcapitatum.

firmation of Pfitzner's scheme and speaking loudly for its acceptance.

To speak now more particularly of the possibilities of variation of the scaphoid bone, we refer to Pfitzner's diagram of the navicular (scaphoid), which he has termed the navicular radiale and navicular ulnare in harmony with his view of two centres. It is the development of a centre of ossification in each navicular radiale and ulnare that gives rise to the so-called bipartite scaphoid, and it is the additional centre of ossification in the centrale which gives rise to the more rare condition of tripartite scaphoid.

Woolf considers two centres of ossification uncertain and not the rule, as Gruber thinks. American anatomies and embryologies state the rule as one centre. Serres recognizes Pfitzner's entire theory of three centres of the scaphoid, which as a rule unite to form one bone. Leboucq never saw more than one centre, which is of value, as he has made important discoveries about the development of the hand Behrendsen and Von Ranke do not mention two centres Von Wyss saw in cretins two centres in the scaphoid, but we do not know his view regarding normal individuals Wilms never saw two centres from birth to adult Gruber states that from 1869 to 1883 he saw 3007 scaphoids in which four were bipartite and one was tripartite Since 1883 he speaks of 1000 scaphoids in one of which were traces of tripartite Pfitzner in 1450 scaphoids saw one half per cent of entire divisions, but he does not make it clear that some, if not all, of these might not have been old fractures Among the 1450 he also saw 2 per cent. to 3 per cent of fissures In looking through 1040 X rays of wrists, we do not find any divided scaphoid which is not definitely associated with injury, even in those in which X-rays of both wrists were taken for comparison *

It is our position in this paper that we have not sufficient knowledge of embryology or comparative anatomy to presume to argue with Professors Pfitzner and Dwight on their own

^{*}There are three possible exceptions to this statement (Cases II, IV, IX) While in these cases the patient could give no history of injury, the presence of secondary arthritic changes and pronounced chinical symptoms speak strongly for the traumatic origin of the lesion

grounds; yet it has not been made clear that a part, if not all, of the divided scaphoids above mentioned may not have been the result of old fractures. We do not wish to assume that variations do not occur; there is no reason to believe that nature does not vary in the formation of the carpal bones as well as in any other part of the body; but we do wish to show that while they may occur, and while we do have to consider the possibility of their presence in any case under observation, nevertheless, they are rare, much more rare than fracture. We wish the possibility of variation understood and appreciated to aid judgment in its interpretation of clinical history.

If the bipartite variation is sufficiently frequent to be a real cause for confusion with fracture, it is a surprising coincidence that no X-rays of wrists taken for other conditions, such as foreign bodies or injuries to the forearm and phalanges as well as many normal wrists taken unnecessarily in a large number of cases, show no bipartite scaphoids.

Woolf cites a case which harmonizes with our views of rare possibilities. It was one which he diagnosed as a bipartite scaphoid; it was bilateral; there was no history of injury; there were no disabling clinical symptoms; forcible abduction showed no dislocation of fragments. He concludes that a part of the so-called bipartite scaphoids are fractures without bony consolidation, simulating other intracapsular fractures. One can only accept the bipartite theory where the halves touch with smooth cartilaginous surfaces. In the cases in which we have operated this was not found to be the case.

The cases illustrating this paper we believe are positive fractures. We say positive, because their diagnoses are based upon a series of definite observations, supported by circumstances of causation, and associated with objective and subjective symptoms, giving a clinical picture which it is not reasonable to accept as happening fortuitously on a previously developed bipartite scaphoid, so accurately harmonizing in every detail with the particular right or left hand in which trauma and local symptoms coincide, and in none of which do both wrists show the same condition.

Variations exist and deserve recognition, but they do not exist so regularly and unilaterally as to coincide in each case with the associated cause of fracture, the objective and subjective symptoms, as to lead one to assume any selective motive for injury to the particular wrist containing a bipartite scaphoid

In confirmation of our opinion, we find in some of our cases that union has occurred as shown strikingly by the X rays in Case VI

SYMPTOMS OF SIMPLE FRACTURE OF THE SCAPHOID BONE.

The cases of fracture of the scaphoid which are herewith reported have, with a very few exceptions, presented them selves from several months to many years after the original injury, so that the history and symptoms should more properly be considered as those of old ununited fractures of the scaphoid than of the recent injury. The typical history has been some thing like the following, and is frequently characteristic enough to permit of diagnosis even without the X-ray.

The patient, usually a male of from twenty five to thirtyfive years of age has fallen on his extended wrist in the same manner as in the injury which usually causes a Colles fracture He has supposed that he has sprained his wrist, and for a few days has suffered severe pain and tenderness and has been unable to use the hand for ordinary purposes During a period varying from a few days to several weeks, according to the hardshood of the individual, he has refrained from using his wrist Gradually he has been able to take up his work again but after a certain point the soreness, tenderness, and dis ability have refused to improve, and perhaps he has suffered some similar injury a second time, and the symptoms have become aggravated again Perhaps the mere mechanical effect of his work has kept the joint in a continued state of irritation Eventually he comes to the hospital complaining of pain, tenderness, and weakness of his wrist Examination shows that the fingers have their normal flexibility, but that the active

and passive motions of the wrist-joint are limited to one-half or less of their normal arc of excursion. Attempts to continue passive motion beyond a certain point, especially in extension, are limited by a most characteristic muscle spasm very similar to that seen in tubercular joints. If the spasm is overcome by force and the wrist moved still further, the pain is intolerable. There is no crepitus or ecchymosis, but there is seen to be slight swelling or thickening over the radial half of the wrist-joint. The outlines of the extensor tendons of the thumb are made less distinct by the swelling, and pressure elicits signs of tenderness definitely localized over the scaphoid bone, and especially in the anatomical snuff-box. The X-ray shows a transverse fracture in the scaphoid.

As compared with the other wrist, a certain amount of alteration of the bony landmarks is found. The relation of the ulna and radial styloids is, of course, normal; but when the wrist is flexed, the prominence formed by the scaphoid just below the lower end of the radius is more pronounced than that of the other wrist and feels quite differently. This difference is, however, not striking enough to form the basis for a diagnosis unless taken with other symptoms. Treatment with counterirritants, massage, rest, forced motions under anæsthetics, etc., fail to bring about any considerable improvement in the condition, and the function of the wrist remains permanently though not greatly impaired.

In order to consider these symptoms more in detail, we have made an analysis of the accompanying eighteen cases which form the basis for the following observations.

Of the eighteen cases, the ages were as follows:

```
2 cases, 18 years. I case, 30 years. 2 cases, 39 years. I case, 19 years. I case, 31 years. I case, 40 years. I case, 25 years. I case, 32 years. I case, 41 years. I case, 27 years. I case, 34 years.
```

Not only all these cases, but all the others which we have seen, were in males of about the same ages. In thirteen of the eighteen cases the injury was to the right wrist.

Most of the patients were artisans in various trades in volving more or less active work, the following occupations being represented boiler-maker, electrician shoemaker, eigar maker, laborer, waiter, two clerks, machinist, electrotyper, hostler, railroad employe, artesian well driller, dentist, two sur geons, yacht rigger, and student With a few exceptions, all of the accidents occurred while these individuals were engaged in some athletic exercise or the injuries were due to some accident not necessarily connected with their trade. In two instances only the injury was caused by direct violence, viz. in Case I, a kick in the wrist, in Case VIII a marble slab fell on the wrist. In the other instances the injury was due to indirect violence or unknown causes viz, in Case III, a fall from a bicycle, in Cases V and XV, in playing foot ball, in Cases VI, X, XII, XIV, XVI, and XVII, from falls varying from one to twelve feet. In only eight cases were we able to obtain a history as to whether the injury occurred in extension or flexion of the wrist, in five of these it occurred in exten sion, * in the other three, viz, Cases VI, XIII and XVIII, the patients thought that it occurred in flexion, although they were not certain. In every case the pain was at first intense and followed immediately by swelling and excessive tender ness In nearly every case, the exceptions being those in which the X-ray was taken, the immediate diagnosis of the physician in attendance was "sprain"

Several cases did not consult a physician at all after the first injury, and only came under observation after the lapse of time had failed to relieve their pain and tenderness. In only three cases was there a continued fixation of the wrist in splints for more than a week, these nere Cases VI, X, and XIII which were the only cases which resulted in union. This fact is very important as emphasizing the tendency of active and

^{*}If the reader will examine the extended wrist of a skeleton he will see that a force exerted in the direct line of the axis of the radius must be transmitted through the scaphoid. Blus has pointed out that such a force will tend to break the scaphoid at its weakest portion i.e. the neck which by such force is brought to bear against the styloid of the radius.

passive motions to prevent union, because in all the other cases in which fixation was not maintained union did not occur. Many of the cases complained of secondary injuries which had brought on much the same symptoms as those suffered at the original injury. Cases I, III, V, VII, VIII, XI, XII, and XV are instances of this.

In the majority of the cases the fracture had occurred at almost exactly the middle of the scaphoid, but in five cases, viz., IX, XIV, XV, XVI, and XVII, it occurred at the junction of the middle and proximal third. We are not able to say whether this form of fracture is more or less serious than that of the transverse fracture at the middle of the bone. In either case there seems to be very little tendency towards displacement. In both of the operated cases the displacement was barely perceptible.

As a rule, the patients complain that the forms of motion which cause pain are those which involve pushing with the extended hand or twisting, e.g., opening heavy doors, turning door-knobs, rising from a chair and using the extended hand on the arms of the chair to help in lifting the weight, rowing, playing games, as foot-ball or tennis, fooling with other men, unexpected twists of the wrist, etc. The disability may seriously interfere with the patient's work; for instance, J. G., Case I, is a boiler-maker,—the wrist bothers him most of the time; Case II is a shoemaker,—he is continually troubled with it; Case III is an electrician,—he finds it very inconvenient in using a screw-driver and in writing; Case XIV is a dentist,—he finds his wrist extremely painful in grasping his instruments, especially in pulling teeth.

The tenderness in all the cases was very characteristic, being definitely localized in the scaphoid bone itself, and being especially acute in the anatomical snuff-box. If, in an uninjured adducted hand, the thumb of the examiner be pressed just below the styloid process of the radius in the anatomical snuff-box, the patient will feel an acute tenderness from the pressure on a branch of the radial nerve against the scaphoid bone. This "normal tenderness" is, however, bearable even

if great pressure is made. On the other hand, if the scaphoid is broken, even if the injury occurred many years before, the tenderness in the snuff-box will be too great to be borne without wincing, and the patient will usually try to withdraw his hand As a matter of fact, when the wrist is adducted and pressure made in the snuff box, the point touched is almost exactly the middle third of the bone where the fracture occurs Although the tenderness is most marked in the anatomical snuff box, there is often found in old cases tenderness over the dorsal portion of the scaphoid Tenderness in this region is, however, much less acute, and is scarcely more noticeable than in the other portions of the wrist. In a number of cases tenderness over the unciform bone has also been noticed. We have been unable to account for this Curiously enough the scaphoid tubercle does not seem to be at all tender, and even when firm pressure is made on the tubercle, no pain is caused This is probably due to the fact that the tubercle is so firmly held by its ligamentous attachments that the position is not changed by pressure

The swelling in both acute and old cases is in very much the same distribution as the tenderness, being more distinct on the radial half of the wrist and especially about the tendons bounding the snuff-box There is usually no great swelling, but on comparison with the other wrist there is no difficulty in seeing it Immediately after the injury there is usually a great deal of swelling of the wrist and dorsum of the hand, so that the diagnosis may be found more difficult than in old cases where the tenderness and swelling are more definitely localized in the scaphoid region. In no case have we found crepitus or ecchymosis, although in a few cases the patients themselves have said that the wrist was black and blue soon after the injury Since very few of the cases have come to us at this stage, we are unable to speak very positively on this point Most of our cases have come after some secondary injury, the original fracture having occurred some years before In no case do we recall giving a patient ether and manipulating the wrist forcibly in order to obtain crepitus

We have been satisfied with the clinical and X-ray diagnosis, and have not thought it necessary to use ether. We are inclined to think that crepitus and ecchymosis seldom, if ever, occur in simple fracture of the scaphoid. The reason for the absence of ecchymosis is that what bleeding there is from the broken bone must go directly into the joint, the capsule of which would not let it escape, thus preventing extravasation of blood from appearing under the skin. The absence of crepitus is due to the accurate fitting of the bones of the wrist, which permits only the slightest possible degree of motion of the fragments. This was beautifully demonstrated in our two operations, where on manipulating the wrist only a very slight play of the fragments was observed.

DIAGNOSIS OF SIMPLE FRACTURE OF THE SCAPHOID.

The consideration of the eighteen cases which we present shows that in the majority the first diagnosis in these injuries has been that of an ordinary sprain, and in the few instances where the diagnosis was at once made, it was confirmed by the skiagraph. We, however, feel that in many of these cases the diagnosis could have been quite positively made on the clinical symptoms; in fact, we have in a few cases made the diagnosis positively before our skiagraph was taken. It must be admitted, however, that in other cases we have been in doubt. For instance, in the following case:

P. F., aged seventeen years; school-girl. This patient, while bowling at cricket in the spring of 1902, in England, felt something snap in her wrist. There was immediate and intense pain and inability to move the fingers or wrist. There was local tenderness and swelling in the region of the scaphoid, and all attempts at motion were very painful. She saw a physician at once, who diagnosed it a sprain, and put her wrist on a splint, and put the arm in a Velpeau bandage with the arm and splint lying across the chest. The wrist was kept in this position for six weeks, and when the splint was removed she could scarcely move her fingers at all. Under massage and similar treatment she slowly recovered the use of her fingers, but the wrist has never been entirely well since.

Six or seven times in the past two years she has injured it less severely, and each time it has been accompanied with intense pain. Six weeks ago, while getting off an electric ear, she in jured it again, not by falling, but by twisting it as she held the railing in getting off the ear.

Examination on May 12, 1904, showed the faintest possible swelling in the region of the scaphoid and marked tenderness over the whole region, particularly in the smill box. When her wrist was flexed there was a difference in the contour of the bony landmarks. She could flex the wrist about three quarters the normal are and extend it a little over half. Adduction and abduction were about four fifths the normal. She said that it interfered in writing in practising her music, and almost every thing that she did with her hand. The X-ray showed no definite indication of any injury to the scaphoid.

In this case the clinical history and examination tally very well with fracture of the scaphoid, but the X ray showed no indication of it. Since, however, the X-ray was not taken until two years after the injury, and at the time of the injury the wrist was kept for a long period in fixation, it is possible that fracture did occur and union took place as in Cases VI and VII. Although union may have taken place, some little distortion of the scaphoid bone may have remained, causing imperfect function of the wrist-joint and the pain of which this young woman complained.

In our experience, cases of sprained wrists, which have been shown by the X ray to have no fracture, have recovered promptly, that is, within a few weeks, therefore, in the diagnosis from sprain, besides the local tenderness, extensor spasm, etc., we may say that the persistence of the symptoms speaks strongly for fracture of the scaphoid. We cannot feel sure, however, that some cases of fracture do not occur in the scaphoid which run a more favorable course and are soon followed by union and complete restoration of function. From our experience, however, we feel that non-union and disability, as a rule, result

Besides simple sprain of the wrist, there have been other

cases in which a fracture or fissure in the lower end of the radius have made us suspect fracture of the scaphoid. In these cases, however, careful palpation will almost invariably show that the maximum point of tenderness is on the lower end of the radius and not on the scaphoid. Another point which may assist in this diagnosis is a fact which one of us (E. A. C.) has called attention to in a previous publication, i.e., the sudden appearance of fluctuation in the common bursa or sheath of the tendons of the extensor carpi radialis brevior and longior and extensor secundi internodii pollicis. As this bursa has for its base the periosteum on the posterior part of the lower end of the radius, a crack, either longitudinal or transverse, in this portion of the radius is apt to rupture the base of the bursa, and bleeding takes place into the bursa without appearing as ecchymosis in other parts of the wrist. The result is a tense, fluctuating swelling of rather triangular shape overlying the radial half of the wrist-joint, and extending somewhat up on the lower end of the radius on its dorsal aspect. Since the bursa is thick-walled, the color of the blood does not show through. We have come to regard the presence of this engorged bursa immediately after an injury to the wrist as diagnostic of a fracture or fissure of the lower end of the radius. It is most common in Colles fracture, but may also merely represent a fissure in which there is no displacement of the fragments. In a complete Colles fracture it is sometimes so badly torn that the blood escapes from it, and hence it does not appear fluctuant. Curiously enough, although the presence of this engorged bursa does not speak for fracture of the scaphoid, it nevertheless anatomically overlies the scaphoid region, and pressure over it causes pain which may be mistaken for pain due to pressure on the scaphoid. We have occasionally also seen this phenomenon in the bursa of the extensor metacarpi pollicis and primi internodii pollicis which form the other boundary of the snuff-box. In making the diagnosis of fracture of the scaphoid as distinct from Colles fracture, one must not forget that both lesions may exist at the same time. We have seen a number of instances of this.

In fracture of the scaphoid the relations of the styloids are normal. We have also seen cases which have been complicated by fracture of the base of the metacarpal of the thumb

In the cases which present themselves long after the injury, confusion with the different forms of arthritis is apt to arise in making the diagnosis In fact, in such cases the natural diagnosis, unless the history of the injury was definitely recounted by the patient, would be osteoid arthritis Against this diagnosis, however, we usually find that the patient is rather young, and that his other joints show no evidence of this disease A careful questioning will bring out the history of a definite injury Then, too, examination in variably shows the characteristic tenderness in the snuff box and spasm in forced extension of the wrist. In two cases we recall confusing the lesion with tuberculosis of the wrist, but the absence of the history of the injury and the presence of the local heat, the character of the spasm, and, finally, the location of the tubercular focus by the X-ray, served to make the diagnosis

In certain cases of inflammatory bursitis of the carpal tendon sheaths confusion might also arise, as these sheaths, as we have said in speaking of hæmorrhage in them, overlie the region of the scaphoid. In such cases, however, the history points to over use rather than to any injury to the wrist. The location of the tenderness along the courses of the sheaths themselves, rather than deep in on the bone, and the presence of the characteristic crepitus of tenosynovitis suffice to differentiate this lesion.

THE USE OF THE A RAY IN DIAGNOSIS

Owing to the peculiar shape of the scaphoid and to the obliquity of the angle with which its long axis lies in relation to the bones of the arm and hand, the appearance it gives in the X-ray is extremely apt to be deceptive. The diagnosis made on the X-ray alone should be made with the utmost caution, and only considered positive when a good view of the bone at right angles to its long axis is obtained.

The scaphoid is shaped roughly like a peanut, and lies, when the hand is laid prone upon a photographic plate, with its long axis at an angle of about 45° with the sagittal, vertical, and horizontal plane. Therefore, to obtain a skiagraph of the scaphoid which shall not be distorted, the tube should be in front, above and to the inner side of the wrist. when this precaution is taken, there will still be a slight distortion, because the proximal end of the scaphoid is at a greater distance from the plate than the distal end. The result of this will make the shadow of the proximal end larger than that of the distal end. This latter distortion may be obviated to a certain extent by adducting the wrist. This extends the scaphoid bone, that is, it lifts the distal end so that it comes nearer the plane of the proximal end. In abduction, however, the obliquity is increased and the long axis of the bone stands much more nearly vertical to the plane of the plate. The effect of taking a skiagraph in this position is to throw the shadow of one-half of the peanut so that it overlaps the other half. Since the neck between the two halves does not show, this will give the appearance of two separate pieces, one lying over the other.

If the reader will hold between his thumb and forefinger an ordinary peanut and look at it laterally, so that he can see the long axis at its maximum, he will see the best position in which to take a skiagraph of the scaphoid. If he then rotates the peanut so that its long axis becomes more and more oblique until it is vertical and points directly towards his eye, he will be able to see that the skiagraph will throw the shadows of the two halves of the peanut as separate objects if taken from this point of view.

A practical way to obtain a good picture of the scaphoid is to place the two wrists of the patient in adduction, and to place the tube in a position over the midline between the two hands, as far forward as the level of the knuckles.

Another point which it is well to bear in mind in making the diagnosis of fracture of the scaphoid is the existence of two more or less prominent bony ridges on the neck of the scaphoid bone which bound the edges of the articular surfaces. These ridges in some cases are very prominent, and as the neck of bone between these two ridges is the thinnest portion of the bone, it is apt to give the appearance of a fracture, unless the X-ray is good enough to show the detail definitely. If the X-ray picture is taken correctly, and a good view of the bone in its long axis obtained, a positive diagnosis can readily be made, for not only can the line of fracture be seen, but often the exact region of the interruption to the trabecular structure of the bone.

It is often very difficult to determine the exact obliquity of the plane of the fracture This can only be determined by taking a skiagraph which will pass directly through the line of fracture and show an interval between the fragments where there is no overlapping of the two portions. In the two cases in which we operated, we unfortunately did not make a special effort to determine this, and the X rays taken before operation merely showed that there was a line of fracture and that the two fragments overlapped At the operation the cleavage was found to run in such a direction that on looking into the wound, after removal of the proximal fragment, the raw sur face of the distal portion formed the bottom of the cavity and faced the median line of the dorsum of the wrist. To make the diagnosis positive, one should always take more than one, better three or four skiagraphs from different angles so as to catch the exact plane of the fracture if possible

From the X-ray appearance we may also form an approximate idea of the time since the fracture has taken place, at least, we may tell whether it has occurred within a few weeks or took place months or years previously. One seldom sees any effort at callus formation, but occasionally this does take place. In Case IV we have a series of \(\lambda \) rays which show a slight callus formation which his increased in amount at intervals of many months. As a rule, the secondary joint changes in other portions of the wrist are more obvious than callus formation of the fracture itself, and one may see on the adjacent surface of the radius and carpal bones little osteophites or liplike formations at the edges of the articular surface of the radius and carpal bones little osteophites or liplike formations at the edges of the articular surface.

faces. These do not form until some months or years after the fracture has occurred, and represent the reaction to the mechanical irritation of the displaced fragments. This condition is more pronounced in individuals who are obliged to use their wrists a great deal in their occupations. It has the same general appearance as osteoid arthritis. (I recall making the diagnosis of osteoid arthritis in one of my early cases of fracture of the scaphoid (Case III), and only after the careful examination of the plate in preparing this paper did I see my mistake.—E. A. C.)

Another point which may speak for the existence of an old fracture is a distinct atrophy of the proximal fragment. In several of our skiagraphs of old cases this atrophy of the proximal fragment is noticeable. It probably represents diminished blood-supply, owing to the fact that the main nutrient artery of the bone enters the distal fragment. In some of the older cases, also, there is a distinct change in the appearance of the line of fracture. It becomes more smooth and resembles more closely a normal articular surface. The edges of this false joint are often marked by two dark lines in the skiagraph which represent an increase of density of the superficial layers of the fractured surfaces of the bone. This appearance is very beautifully shown in Case IX. At the edges of such fractured surfaces there sometimes form the secondary osteophites spoken of as existing on the articular edges of the radius and other carpal bones. In cases where the original injury was of a very severe character, and perhaps the other carpal bones were injured too, as in cases of dislocation of the semilunar with fractured scaphoid, these joint changes have gone on to such a degree that the original outlines of the bones are scarcely recognizable. This is illustrated in Case XIII. Such old misshapen joints may be readily confused with the results of rheumatoid or osteoid arthritis

TREATMENT OF FRACTURE OF THE SCAPHOID.

It is obvious that treatment of fracture of the scaphoid must be considered according to the time after the injury when the patient comes under observation. If the patient is seen immediately after the injury, we believe it is possible, by fixation of the joint for a proper period, to obtain union between the fragments. If, however, the wrist is not fixed during the first three weeks after the injury, our observations would tend to show that union does not occur and the fracture remains permanently ununited. We believe that if the fracture does remain ununited the permainent disability is so great that it seriously interferes not only with the comfort of the patient, but with his ability to enjoy certain games and sports, and also in the case of working-men it limits their working capacity, and hence their ability to earn their living

In our series of cases there are only three in which the wrist was kept on splints continuously for more than a week after the injury These cases were VI, VII, XIII In all three cases union has apparently occurred, as shown by the X ray taken a year later In spite of union having occurred in these three cases, however, the final result does not show much improvement as compared with other cases where the fracture has remained ununited Two of these patients com plain of a great deal of pain and tenderness, and the third has still slight impairment of the functions of the joint. It so happened, however, that in one case (Case VI), that of a colored man, there was a medicolegal question which at the writing of this paper had only just come to court, and it is not unlikely that this fact may account for a portion of the man's disability at present The second case is a machinist, and his occupation obliges him to continually turn and twist the wrist in a way which would tend to irritate it and cause what little soreness there is

In spite of the poor results in these three cases, however we believe that these individual patients were not especially favorable subjects, and that in recent fractures we should endeavor by fixation for a number of weeks to obtain union before resorting to excision. At just what time after the injury effort to obtain union by fixation should be abandoned is a very delicate question. We should answer this by saying

that after a fixation of four weeks we should resort to massage, etc., for another four weeks, and if at the end of this time there was no encouraging improvement in function, and the X-ray showed no sign of union, we should advise operation. We do not believe fixation would be worth attempting at all after the eighth week, if, in the meantime, the patient had been using his wrist.

Since, in nearly all of the cases which we have followed, the patients have asserted that no help was received from any of the ordinary treatments of sprain, even when we have recommended those treatments ourselves, we feel that such applications are merely a waste of time, and that when we have decided that an attempt to obtain union by fixation is useless, we should at once recommend excision of one-half or both halves of the bone. Apart from the hopelessness of obtaining union, we find that excision of the bone is indicated to relieve the mechanical irritation caused by the slipping of the fragments on one another, which sets up a chronic synovitis and leads to more or less secondary change in the joint. Thus the joint, instead of improving with use, tends to get worse rather than better, and is ever becoming more subject to renewed injuries and the stiffening effects of chronic arthritis.

When the case is seen many years after the injury, the question is presented in a still different point of view; for instance, Case XV, a personal friend and a surgeon, had broken his scaphoid bone ten years previously in playing football, and since that time had had repeated injuries. This individual had become more or less used to the tenderness and lack of suppleness in his wrist, and since he had become accustomed to it for so many years, the question of excision seems to have a different bearing. In his case, however, because he is fond of athletics, and because the soreness troubles him in his surgical work, we are inclined to advise excision of the bone; although we should hesitate to urge the operation on the ground that a certain amount of compensatory arthritis has already taken place, and even though the source of irritation is removed, the expected result cannot be so good as in a

more recent case in which no secondary joint changes have taken place. On the other hand, in the case of another per sonal friend, also a surgeon, who had suffered the same injury only three months before, we did advise excision of the frag ment on the ground that no secondary changes had taken place, and that we might expect the tenderness, pain, and spasm to be relieved when the source of irritation was removed. The result so far has justified our expectations, and within six weeks after the operation the patient asserted that the wrist was already better than before it was operated on. In the only other case in which we were able to obtain the consent of the patient for operation (Case XVII), the result has been equally satisfactory, although the injury had occurred six months before the operation.

The experience of the other cases which have not had operative treatment has been almost negative, even rest and massage only producing slight temporary benefit, excepting in the acute stage, where the immediate pain and tenderness are certainly helped by the application of a splint Liniments and counterirritants appear to have no effect

We have regarded any mechanical method of stimulating callus formation between the fragments as much more dangerous to the wrist-joint than excision, particularly as the three cases, in which we have observed that union has occurred, more or less disability has still remained

We believe that if operation is refused, the wisest treat ment is to merely guard against further injury, and by limiting the use of the joint to endeavor to avoid a chronic arthritis Many patients have felt relief by wearing a leather wristlet, but this has produced no essential improvement

The operation for removal of the proximal fragment of the scaphoid bone which we have devised is quite simple and easy of execution either under occane or ether. An incision one half inch long is made on the dorsum of the wrist just to the inner side and parallel to the border of the extensor carpi radialis longior tendon. The skin wound is held apart with retractors, and an incision of about the same length in

the same line made through the annular ligament in the fibrous septum between the long extensors of the fingers and the long extensors of the wrist. This may be done without opening the bursæ surrounding any of these tendons. It will be found that the annular ligament does not gape when the wound is made, so that the incision in the ligament has to be held apart with retractors. Even if the bursæ are opened, as in one of our cases, there is apparently no harmful result. This incision directly exposes the wrist-joint over the proximal half of the scaphoid bone, and if the wrist be abducted, nearly the whole of the scaphoid bone can be brought across the incision. The line of fracture is found on the articular surface towards the radius and a blunt hook introduced into the fissure. XVI, our first case, this line was difficult to find because the cartilaginous surface was broken across obliquely so as to produce bevelled edges which overlapped. With a tenotome the ligaments connecting the posterior portion of the proximal fragment with the capsule of the wrist-joint and with the semilunar are divided. When these have been divided, the fragment still does not move greatly from its position, so that it is necessary to pull firmly upward with a tenaculum through the wound and flex the wrist in order to divide with the tenotome the anterior ligamentous attachments. In both of our cases little flakes of bone were torn from the anterior face of the fragment by the ligamentous attachment and had to be removed after removing the main portion. We found that the distal portion of the scaphoid remains firmly attached to the surrounding ligaments and appears to be capable of taking up the functions of the whole bone.

The wound may or may not be closed. It will be found that the incision through the posterior part of the capsule and annular ligament has no tendency to remain apart, and a stitch in it seems unnecessary. In our first case this was drawn together lightly with one catgut suture and the skin wound left open. The patient had a great deal of pain the first night from distention of the wrist with fluid, whereas in the second case, where we purposely did not close the ligament, there

was practically no pam. In both cases the skin wound was closed by a single subcutaneous suture, which was not pulled tight until the following day in order to let the discharge of serium relieve the tension of the joint, and thus avoid pain

We advise beginning very slight passive motion within a week in order to prevent adhesions, and at the end of two weeks entire removal of the splints and both active and passive motion of the joint permitted. The use of the fingers may be allowed at the end of a week

The only unpleasant symptoms which have followed in either of these operations have been in the first case,—a slight irritation of the wound due to a rather excessive discharge of synovial fluid from the joint, and in both cases adhesion of the skin wound to the wound in the ligaments. This has produced a puckering of the skin of the wrist in extension which is somewhat unsightly, although not painful. This, of course, could be easily remedied by removing the scar in the skin and resuturing, but in the next case we should prefer to make the skin incision transverse and the incision in the ligament vertical.

We feel, from the study above presented, that the following conclusions as to the treatment of simple fracture of the scaphoid are justified

- I Cases which have not been treated or which have been treated as sprains, by a short period of fixation followed by massage, active and passive motion, etc., seldom, if ever, have union of the fragments
- II If the joint is kept fixed for a number of weeks imme diately after the injury, union may occur, but the functional result is not perfect, although better than in cases of non union
- III It is too late to obtain union if fixation is not at tempted within a few weeks after the injury
- IV Excision of the proximal half of the broken scaphoid promises a better ultimate result than any other form of treatment

V Since operation, nevertheless, is an undesirable risk, a reasonable attempt should be made to obtain union by fixation, if the case is seen soon after the injury

VI. Operation should not be delayed many months, because secondary joint changes may occur and chronic arthritis result.

VII. The advisability of operation in cases of long standing is doubtful, and must be decided by the amount of disability present in each individual case.

CASES OF SIMPLE FRACTURE OF THE SCAPHOID.

CASE I.—J. G.; boiler-maker; aged thirty-two years; male. This patient was injured in a street fight, July 6, 1897. Among other injuries, he was kicked in the left wrist by one of his assailants. He came to the Out-Patient Department of the Massachusetts General Hospital the next day. There was considerable swelling over the wrist and some tenderness, but no apparent fracture. He was not examined by the X-ray. A diagnosis of sprain was made, and splints and bandages applied, and he was told to return in a week. He did not return, but removed the splints in a week and went to work. He came to the hospital again in December, 1897, complaining that the wrist had troubled him ever since the injury when he did hard work, and, as he is a boiler-maker, this means most of the time. At this time there was no swelling or deformity; flexion and lateral motion were noted as perfect, but extension was limited about one-half. He said the wrist was stiff when he began work in the morning. The X-ray showed a fracture of the scaphoid bone in its middle third.

Case II.—M. H.; shoemaker; aged twenty-seven years; male. This patient came to the Massachusetts General Hospital, March 24, 1899. He said that for four years he had had pain in his right thumb and weakness in his wrist. The pain went away with rest, but came on again when he worked. For four days before he came to the hospital there had been a swelling on the back of the hand. Passive motion was interfered with by stiffness of the joint, and there was local swelling at the base of the thumb. There was no numbness or motor weakness. He gave no history of having had an injury, but the X-ray showed a fracture of the scaphoid bone, with some old injury of the lower end of the radius as well.*

CASE III.—N. W. J. H.; electrician; aged thirty-three

^{*} For the notes on this case and Case I we are indebted to Dr. F. G. Balch, although Case I was seen by E. A. C.



3			
			,
	•		
	· ·		
	•		

years, male This patient first injured his right wrist by falling from a high bicycle on his extended hand in the summer of 1895 He does not remember that he received any treatment for it The wrist remained lame and troublesome, and in March, 1901. he again hurt it while stretching a wire in doing some electrical work At this time he was using a screw driver both before and after the injury He thinks this aggravated his symptoms About this time he came to the hospital under my care, and was treated by the application of a leather and, later, a steel splint My diagnosis at this time was an arthritis of the joint between the trapezoid and scaphoid and, in spite of the fact that at this time I had already seen a number of X-rays of fractures of the scaphoid, I did not make a positive diagnosis It was only re cently, on looking over his plate with other X ray plates, that I felt confident of the diagnosis (E A C) The patient, by letter, on April 17, 1904 says that the wrist still troubles him, especially in such motions as using a screw driver and using pen and ink He says that now there is no swelling or tenderness "exteriorly,' that it aches and feels sore internally after a few hours' work, and in much less time if the work is heavy. He cannot write legibly if he tries to write quickly and the wrist is much less useful for every purpose

The X-ray taken on the 15th of March 1901 shows an old fracture of the scaphod bone with an overlapping of the fragments and a decided amount of secondary bony change in the region adjacent to the trapezoid. The X ray also suggests that there was a third small fragment as well as the two large ones. The fracture occurred at the middle of the bone. Unfortunately, the only skiagraph we have was taken in the straight position instead of in adduction.

CASE IV—A D, teamster aged thirty nine years male. This patient presented himself at the Massachusetts General Hos pital on the 22d of March 1901. About an hour before his thumb had been injured by having a truck roll over it. An X-ray taken at the time showed an oblique fracture of the proximal phalams of the thumb of the right hund and incidentally a fracture of the scaphoid bone, but since there was a considerable deformity of the adjacent portion of the radius, it was evident that the fracture of the scaphoid had occurred some years before. The patient could remember no minury to his wrist previously. The

fracture of the thumb was set and convalescence was uninterrupted. He returned for examination on April 5, 1904. The bony landmarks in the neighborhood of the scaphoid were much altered from their normal relation, and his power of flexion, extension, and abduction were slightly limited; adduction was normal. He stated that the wrist did not interfere at all with his work.

The X-ray taken on the 22d of March, 1901, shows a fracture of the scaphoid at the junction of the middle and proximal third. The shadow of the distal fragment is distinctly more dense than that of the proximal fragment. The line of separation of the two fragments is not clear. The plane from which the X-ray was taken suggests that the fragments overlap, so that the rays did not come directly through the gap between them. There is a distinct secondary alteration of the line of the lower end of the radius in the portions which come in contact with the deformed scaphoid.

The X-ray taken on April 5, 1904, shows much the same condition as that taken in 1901, except that the scaphoid appears to have partially united; although this appearance may be due to the overlapping of the fragments. The scaphoid of the other side shows no indications of a weakened area in the region where the other is broken. We cannot assert positively that this was not a case of bipartite scaphoid, but the presence of arthritic changes indicates very strongly that it was a traumatic condition.

Case V.—H. S. F.; student; aged nineteen years; male. In the latter part of October, 1901, this patient "sprained" his left wrist in playing foot-ball. Three days later he sprained it

CASE V.—H. S. F.; student; aged nineteen years; male. In the latter part of October, 1901, this patient "sprained" his left wrist in playing foot-ball. Three days later he sprained it much more severely. There was great pain and swelling and tenderness over the wrist-joint. All motions were painful. The surgeon of the foot-ball squad considered it a sprain, and the wrist was kept on a splint for about a week, after which the patient was allowed to use his hand. Although there was some improvement in motion, the tenderness and swelling still continued, and about two months later the patient consulted me at my office.

At the time I saw him there was decided swelling over the radial half of the wrist-joint, great tenderness over the scaphoid bone, particularly when pressure was made in the anatomical snuff-box with the wrist adducted. There was marked spasm

in extension, so that the wrist could only be extended for 10° or 15° without giving great pain I made a diagnosis of fracture of the scaphoid and confirmed it with the X ray As two months had elapsed since the injury and there appeared to be no sign of union, I thought it was probable that the fracture would remain ununited, and, therefore, only kept the patient on splints for two weeks, at the end of which time I began massage This was contimed for several months, but the condition of the wrist was not greatly improved The disability remained so great that, in consultation with Dr A T Cabot in the spring of 1903, we thought it wise to break up the adhesions under ether so as to allow more free motion. This was accordingly done. When the muscles were relaxed under ether, it was found the wrist could be extended through its normal arc without any great force being used Twice after this within the ensuing month the wrist was forcibly extended without giving ether, and, though the spasm was very marked, the normal arc of motion could be gone through The pain however, was excruciating, and a great deal of swelling and tenderness followed without a proportionate amount of benefit

At the present date, March 28 1904 the condition is not greatly different from that when I first saw him two years ago There is still a fulness in the radial half of the wrist-joint and decided alteration of the bony landmarks, there is acute tenderness in the snuff box, and any motion which forces the hand backward in extension beyond an angle of about 40° is extremely painful and checked by involuntary spasm. Flexion and adduction are normal, but abduction can only be carried a few degrees from the straight position.

The X-ray in December, 1901, showed a transverse fracture in the middle of the left scaphoid Several months later, January 28, 1902, there appeared to be a collar of bony callus formed about the seat of fracture, but no umon between the fragments On March. 26, 1904, the X-ray shows a still larger bony callus which seems to arise cheefty from the distal frament

which seems to arise chiefly from the distal fragment

CASE VI — M J, water aged thirty-three years, male, colored On May 13, 1901, this patient fell from a staging on his flexed right hand He went to a doctor at once, and was told that he had "spramed" the wrist The next day he came to the Massachusetts General Hospital, Out Patient Department, where an X-ray was taken showing fracture of the scaphoid, and

he was put on splints for about three weeks and afterwards bandaged and massaged. As far as he can remember, it was under treatment eight weeks.

On February 8, 1904, we examined the patient again. Considerable alteration of the bony landmarks was found, and there was no local swelling, but decided tenderness. He had about one-half of the normal extension of the wrist-joint and slight limitation in flexion; abduction and adduction were normal. He said that it interfered with his work a great deal; that he could not carry heavy weights in that hand; that he could not press forward very hard, as in opening a heavy door. Extreme motions in all directions caused pain in the region of the scaphoid. He thinks the wrist is a little better than it was a year ago. Since this patient was suing for damages for this injury, we feel that he may have somewhat exaggerated the amount of disability.

The X-ray at the time of the original injury showed a fracture exactly in the middle of the right scaphoid, and a small fragment on the radial side of the bone in addition to the two main fragments.

The X-ray in November, 1904, shows that union of the bone has taken place, but there is considerable change in the normal outline. The middle fragment on the radial side has formed a small protuberance.

Case VII.—J. C.; electrotyper; aged eighteen years; male. In November, 1901, J. C. "hurt" his left wrist in playing football, and again "injured" it from a fall from a bicycle May 7, 1902. He regarded the injury as a sprain on both occasions, and did not consult a doctor until May 10, 1902. He wore a wriststrap after the first injury, but no splint was applied. On May 10, 1902, he came to the Massachusetts General Hospital, Out-Patient Department, under my care. He was kept on splints for four or five weeks, and then massage was used for a short time afterwards. At the time I saw him the symptoms and signs were characteristic of fracture of the scaphoid, i.e., localized swelling, tenderness, spasm in extension, all motions somewhat painful, particularly if forced beyond the degree in which involuntary spasm began. There was no ecchymosis. The patient said that at the time of both injuries the pain had been extreme. The treatment in this case seemed to be quite effective, and at the time of discharge the incapacity was not as great as is often seen.

This same patient in July of the same year hurt his right wrist, and possibly suffered the same injury in his right as he did in his left wrist That of the right was caused by catching a swift base ball, which forcibly extended his wrist. The injury seemed to him so nearly like the original mjury to his left hand, that he made his own diagnosis, and was able to assist his own physician in the treatment, and did not come to the hospital He kept the wrist on a pasteboard splint for three weeks before beginning to use it, and had no massage after leaving off the splint Examination of the patient was again made on January 29, 1904 The left wrist was slightly tender, not swollen, and the limitations were only slight His right wrist was, however, decidedly tender, extension and adduction were limited one half and the other motions were considerably more impaired than those of the left There was slight alteration of the bony landmarks He says that neither wrist interferes with his work, but that he notices both in unusual exercise especially when fooling with other men or when playing games

The X ray of the left wrist in May, 1902 shows a subluxation of the semilium and a chip off its posterior edge, as well as a fracture of the scaphoid. It is unfortunate that we are unable to reproduce the X-ray in January, 1904. It showed no sign of fracture of either scaphoid, and it is particularly interesting that in this case the epiphyseal lines in the radius and other bones have united as well as the fractures of the scaphoids. This case from the fact that he may have had a fracture of both scaphoids, and that the scaphoids have united at the same time when the epiphyseal junction took place, speaks for Professor Dwight's hyothesis.

CASE VIII—E G, cigar-maker, aged thirty-three years, male About fourteen years ago E G had a marble slab fall on his left wrist A day or two later his hand was forcibly extended by indirect violence from a fall (?) He went to the Boston Dispensary and had applications (?) made to the wrist for about a week Since this time he has had more or less trouble with the joint, and came to the Massachusetts Hospital on the 22d of April, 1902 to see if anything could be done for it There was localized tenderness and swelling over the scaphoid and pain on extreme flexion or extension of the wrist There is no record of the treatment that he received at the hospital at that time I saw the patient again on January 29 1904, and found that tenderness

over the scaphoid was still present. There was no swelling, but the bony landmarks were considerably altered as compared to the other wrist. Flexion and adduction were normal, but extension and abduction were slightly limited. The patient said it did not interfere with his work, but occasionally hurt when forcibly extended.

The X-ray shows a united fracture of the scaphoid in the middle third. There appears also to have been some compensatory change in the shape of the articular surface of the radius. The condition of the bone in the X-ray of 1904 is practically the same as that seen in 1902.

Case IX.—P. J. B.; clerk; aged forty years; male. On the 25th of November, 1902, this patient struck a man in the jaw with his closed fist, so that the blow was felt almost entirely on his bent knuckles. He came at once to the hospital. At this time the base of the metacarpal of the right thumb was swollen and tender, and a fracture was diagnosed and confirmed by the X-ray. Incidentally, the X-ray showed an old fracture (?) of the scaphoid at the junction of the middle and proximal third. Owing to the manifest tenderness of the recent fracture of the metacarpal of the thumb, the scaphoid injury was overlooked, and it was not until the following year, in looking over a large number of X-ray plates, that we noticed the scaphoid lesion and sent for the patient.

We examined him on February 10, 1904, with especial reference to the lesion in the wrist; although the fracture of the metacarpal had left a considerable deformity (Smith's fracture). The patient said that he might have injured his wrist years before, but could give no definite history of it. There were still decided swelling and tenderness in the radial half of the wrist-joint, great alteration of the bony landmarks, and all motions of the wrist greatly limited. He said that it did not interfere with him in his work, but did hurt him to row, and it often hurt when he was playing games or fooling with other men. The thickening over the scaphoid was so great as to resemble the fusiform swelling of tuberculosis. The X-ray in this case is very interesting. There appears to have been a fracture at the junction of the middle and proximal third of the scaphoid, following which a secondary deformity of the joint has taken place, and the adjacent bones show the ragged condition so often seen in osteoid arthritis. It is noticeable that the proximal portion of the scaphoid is greatly atrophied as compared to the distal portion, the adjacent edge of which has evi-



		,
		-

dently formed a new bony layer at the fractured surface as shown by a dark line in the X-ray The disability in this patient's case was so great as to warrant my advising excision of the scaphoid, but the operation was refused As in Case IV, we cannot assert positively that this may not be a bipartite scaphoid

CASE X—F E, machinist, aged forty-one years, male In February, 1903, F E fell off a load of logs and landed with is hand under him, hurting it severely. He states that all motions of the left wrist were very painful. There were local swelling and tenderness over the joint. His doctor treated it with antiphlogis tine for two or three weeks, but since the wrist continued sore he came to the Massachusetts Hospital, and it was put in splints for about two weeks. His local doctor had considered it a sprain. The X-ray taken at the hospital showed a fracture of the scaphoid, although not as clearly as it often does, since the fragments were overlapped.

We again examined the patient on February 12, 1904, and found decided localized swelling and tenderness, alteration of the bony landmarks, and limitation of all the motions of the wrist to about one half the normal amount. He stated that it did not interfere much with his work, but he noticed it every day, he could lift but could not twist with that hand, he could not push open a heavy door, and it constantly became sore after use. The thickening about the scaphoid was so great as to induce us to advise him to have the proximal portion of the scaphoid removed. He was not willing, however. The X-ray taken on June 27, 1903, showed considerable atrophy of all the bones of the wrist and fracture of the scaphoid in its middle third, with overlapping of the fragments and a questionable partial subluxation of the semi limar. The X-ray on the 12th of February, 1904, while not clear as to the point as to whether the fracture has united or not, shows a decided alteration as compared with the other wrist.

Case XI—E C, hostler, aged twenty five years, male In 1900 he fell on his right wrist and sprained it. On April 6, 1903, he was thrown by a horse and fell on the right wrist with the hand extended. He came at once to the hospital, and examination showed local tenderness and swelling over the scaphoid, spasm in extension, and pain in all motions. The X-ray showed a fracture of the scaphoid which was evidently not recent, as the outlines were smoothed off and presented the appearance characteristics.

acteristic of an ununited fracture rather than a fresh fracture. In the lateral view a small fragment, about the size of a No. 6 shot, was seen opposite the posterior edge of the semilunar bone; but it was impossible to tell from which bone this fragment had been torn. The patient was kept on splints for about three weeks. No further record of the progress of his case was kept until January 30, 1904, when he was again examined. There was no swelling or tenderness unless extreme motions were forced. There was decided alteration of the bony landmarks. Flexion and extension limited one-half. There was more or less limitation in adduction and abduction. He said that it did not interfere with his work at all, but the characteristic guarding spasm in extension showed there was decided irritation of the joint.

An X-ray taken on the 4th of April, 1904, shows practically no change from the one taken in the previous year.

CASE XII.—E. W. B.; railroad employé; aged thirty-nine years; male. On April 13, 1903, he fell from the top of a freight-car with his right hand doubled up underneath him. He does not know whether his hand was flexed or extended. He came at once to the hospital, and the X-ray showed a transverse fracture of the scaphoid and a Colles fracture. The character of the X-ray of the scaphoid makes it probable that the fracture was an old one and did not occur at this injury. Inquiry later revealed the fact that the cause of the fall from the car was really due to a weakness of the right wrist caused by a fall from a chair three months before. The original injury was supposed to have been a sprain, and he had worn a splint on the wrist for a week, but it had never felt right again. At the time I saw him at the hospital I treated him for the Colles fracture especially, because there appeared to be no especial pain or tenderness over the scaphoid. He was kept on splints, silicates, etc., for about six weeks.

On February 15, 1904, I examined him again. There was no tenderness over the scaphoid, but I found a very slight thickening and a slight deformity over the Colles fracture which obscured the normal relations of the scaphoid. The motions of the joint were only half of the normal, and the patient said that the wrist interfered with his work considerably. Constant strain tired him. He noticed discomfort from it in turning a door-knob or pressing against the wall. The X-ray in April, 1903, shows a typical recent Colles fracture with posterior displacement, a small chip of bone

off the ulnar styloid, and a transverse fracture through the middle of the scaphoid. There are compensatory changes in the adjacent surface of the radius

In the X ray of February 15, 1904, the same changes are noticeable, except that the Colles fracture has entirely healed The scaphoid remains ununited There is no sign of any interval corresponding to the point of fracture in the opposite scaphoid

CASE XIII—W B, artesian well driller, aged forty nine years, male. On April 21, 1903, while he supposed his machine was shut down for oiling, he had his right hand in the apparatus, which started up unexpectedly and caught his wrist and violently flexed it. Three days later he went to the Massachusetts Hospital where the wrist was put on splints for five weeks and bandaged for two weeks longer. The X ray at this time showed a questionable fracture of the scaphoid, there was local tenderness and swelling, especially in extension, slight ecchymosis on the palmar side of the wrist, and all motions were painful.

The patient was examined on February 18, 1904, and the motion of the wrist found to be excellent, except slight limitation in flexion and extension and slight alterations of the bony land marks. He said that it did not interfere with his work at all

It so happened that this same patient had injured his left wrist by having it caught in a cable on shipboard fourteen years ago. There exists at present a marked deformity and bony enlargement of the wrist, with more tenderness over the scaphoid than in any other portion. He can work with it without any trouble, but any blow against the left thumb gives him pain in the region of the scaphoid. The wrist is almost stiff, having only a few degrees of flexion. The X-ray in April, 1903 of this case was interpreted at the time positively as showing fracture of the scaphoid. From the X-ray alone in this case I should be unwilling to make a positive diagnosis, but I believe that the lesson in both wrists of this patient was fracture of the scaphoid in the scaphoid of the X-ray taken in 1904 seemed to indicate that there has been union of the scaphoid in the right wrist.

CASE XIV—G T L, dentist, aged twenty-eight years, male This patient was a student in the Medical School at the time I was first interested in fractures of the scaphod, and a diagnosis was made at that time My notes on the case were lost, and I again wrote to him in April 1904 The following letter from Dr L gives his own version of the history "In answer to

your inquiry, I would say that the fracture of the scaphoid bone of my right wrist happened during the fall of 1896. I was at that time a student at Lawrence Academy, and, while performing on the horizontal bar in the gymnasium there, I slipped and fell to the mattress, a distance of seven feet. Falling forward, I extended my hand as if to save myself, and struck with my whole weight on my right hand and extended it backward. I attempted to continue with the performance, but was unable to use the hand. I visited a physician, who diagnosed it as 'a simple fracture' and bandaged it. This was all the treatment that it had. Your attention was called to it while I was attending a clinic at the Female Out-Patient Department, Massachusetts General Hospital. The same condition is present as at the time that you saw it. . . . causes me the greatest trouble when writing and in extracting teeth, and at times the pain is so severe that I can hardly grasp the forceps. It interferes in any work that requires grasping an object and in pulling, as in extraction of teeth. It soon tires by long use, as in dissecting and writing."

My recollection of the examination of this wrist is that his motions were more free than the usual run of scaphoid cases. He says in his letter that there is no swelling now, but there is "a sort of dislocation, as the fragments slip over one another." I remember that when I saw him at the hospital this snapping of the fragments suggested that one of the tendons was dislocated, so that it snapped in and out of place. I am not sure whether it is really the bone which causes the snapping or one of the tendons.

The X-ray shows an ununited fracture of the scaphoid at the middle and proximal third, with probably a third fragment coming from the middle portion.

Case XV.—H. W. B.; physician; aged thirty-four years; male. In September, 1893, while playing foot-ball, his right wrist was forcibly extended. He consulted a physician within a few hours, and a diagnosis of "sprain" was made, and a leather wristlet was applied, which he wore for about two months. Meanwhile he kept on playing foot-ball in spite of the pain and tenderness. There was marked local swelling in the scaphoid region, spasm in extension, and all motions were painful. The wrist has never been well since, although he has always been able to use it for ordinary work, being occasionally obliged to rest it on account of the swelling, pain, and tenderness. It is subject to injury from any force which suddenly extends the wrist. Within a few

months of the present date, January 30, 1904, there has been one of these exacerbations. There is no distinct swelling and local tenderness over the scaphoid bone, but there is a decided change in the bony landmarks, and all the motions of the joint are slightly limited. There is distinct spasm as the wrist approaches extreme extension. It is, and has been, an annoyance to him in his work, in certain positions hurting more than others, and even at times preventing the use of it for a few moments. Pressure in the snuff box is intolerable. The X-ray shows a transverse ununited fracture at the junction of the middle and proximal third of the scaphoid. The bony structure of the proximal portions is not as clearly defined as in the distal, and it appears to contain an area about the size of a No 6 shot in which the trabecules are destroyed. There are compensatory changes in the articular surface of the adjacent portions of the radius. The other wrist is normal

Case XVI -W C S, physician, aged thirty one years, male On January 20 1904, while in his bath, he fell on his extended right wrist, so that the full weight of his body was thrown onto the palm of his hand. There was extreme pain at once, marked local swelling over the scaphoid, tenderness and spasm in extension, very faint ecchymosis, and all motions were painful Three hours after the injury the wrist was put upon a mill board splint and bandaged The lesion was considered a sprain, so that the splints were worn on and off for a week, being removed at times to allow the use of the wrist After a couple of weeks, as there was no great improvement, a fracture of the scaphoid was suspected, and the patient examined his wrist with a fluoroscope, but the fracture was not seen The symptoms con tinued, and on my examination on March o there was still evident swelling in the radial half of the wrist, decided tenderness in the anatomical snuff box, and a slight change in the bony landmarks as compared with those of the other wrist Motions were somewhat limited and checked by spasm in extreme positions, and the patient complained of pain and weakness in any motions requiring a moderate amount of force

On March 15, 1904, the patient writes as follows "All motions of flexion and extension and adduction are very plainful when forced beyond a certain extent. The whole treatment has been much abused and practically mi in my case. The wrist grows gradually, but slowly better, and has had no serious setback."

The X ray shows a transverse fracture of the right scaphoid

at the junction of the middle and lower third, with a moderate amount of displacement of the proximal fragment. The scaphoids of both wrists in this patient are large. The structure of the bone in the left wrist shows no indication of the existence of a bipartite formation. I advised operation, and performed it as follows on April 25, 1904, under cocaine and with the assistance of Dr. Henry M. Chase.

A tourniquet was placed about the upper arm and about three drachms of one-half per cent. solution of cocaine injected on the dorsum of the wrist in the region of the extensor tendons. An incision one-half inch long was made between the common sheath of the radial extensors and the long extensors of the fingers. The incision was carried through the posterior annular ligament directly into the wrist-joint, with its upper end at the edge of the articular surface of the radius. Retraction of the cut edges of the annular ligament exposed the scaphoid bone. When adduction was made, a fine line of fracture was seen transversely across the articular surface of the scaphoid. A blunt hook was introduced into this fissure, and traction on the hook moved the whole bone instead of one fragment, so that it was evident that either partial union had occurred or that the ligaments held the two fragments so closely together that they moved as one piece. No crepitus could be obtained, and the fragments could barely be made to move on one another. The attachment of the proximal portion of the bone to the dorsal ligament was then divided with a tenotome, and also the attachment of the ligament uniting the scaphoid to the semilunar. A blunt instrument was then introduced into the crevice of the fracture and the distal fragment pried out of its bed. In doing this, the fragment was apparently torn in halves. It was impossible to tell whether this fracture was due to the manipulations of extracting the fragment or whether it already existed. When this fragment was removed, another fragment lying to the palmar side was seen still more or less firmly attached to the distal portion of the bone. This fragment, also, was easily pried out of its bed, and freed by a division of some fibrous bands holding it to the anterior portion of the joint. When both fragments had been taken out, the fractured surface of the remaining portion of the scaphoid was in plain view, and presented the appearance of a fresh fracture. There appeared to be no attempt at callus formation either on the fragment that was left in or on the fragment that was taken out,

with the exception of a few granulation like masses on the surface of the fragment which was removed

When the tourniquet was removed, there was a great deal of oozing from the wrist-joint, so that it was felt univise to close the capsule tightly, particularly as the incision in the ligament seemed to fall together naturally of itself and have no tendency to pull apart. A subcutaneous stitch was placed in the skin in cision and one catgut stitch in the incision in the ligament. The subcutaneous stitch was not pulled tight, so as to allow free oozing into the dressing, and the arm was put upon a palmar splint extending to the elbow, and a voluminous dressing applied. The patient said that except for the tightness of the tourniquet the operation gave him no pain

A letter from the patient on April 28 says, "Just a word to let you know that my wrist is now getting along finely. For the first twenty-four hours the pain was very considerable, much more than I supposed it was going to be, so that I took one half a grain of morphine that night

June 4, 1904 He wore the full length splint for five days, and then shortened it to the metacarpophalangeal joints and wore it for a week more, after which he wore a bandage for three days thus after two weeks he wore no apparatus at all on the wrist. The skin wound did not heal by a perfect first intention (but did not become septic), so that there was a slight ooze from it for about two weeks. About the wound there was considerable thickening of the soft parts and some redness, but no discharge of pus. The swelling and redness have gradually subsided, but they are still present to a considerable extent. He has had perfect use of the fingers since removing the splint, and the wrist feels somewhat better than before the operation.

Examination shows that the scar is rather lumped up, red, and irritable looking. The skin scar is adherent to the ligament ous scar, so that when the wrist is extended there is a reduplication of the skin in folds. His adduction and abduction are normal Flexion within ten degrees of normal and effort at further flexion not painful. Extension is only one half normal, and forced extension is still painful as in an ordnary scaphoid case. He says that a straight pull or a grasp does not hurt him, but in certain positions of twisting or where leverage is made on the thumb there is decided pain, particularly when his wrist is relaxed and the force unexpected. He has not attempted to play golf or

tennis, as he still feels that the wrist is too weak. It does not bother him, however, in operating.

A letter from the patient on October 11, 1904, says, "In answer to your letter of the 2d inst., I will give the following report. Present condition of wrist.

"Adduction complete; slight pain on forcible adduction; slight tenderness on pressure over point of the scaphoid, but less than three months ago.

"Abduction slightly limited, and pain on forcible abduction.

"Flexion very slightly limited; no pain on forcible flexion, but a pull on the adhesions of the scar.

"Extension slightly limited; less so than three months ago;

slight pain on forcible extension.

"In other words, ordinary movements of the wrist are free and without pain, almost normally strong in grasp, except where there is too much tax in a position of adduction.

"In my hospital service of three months' operating this summer I was not inconvenienced at all by the wrist, except at first would feel pain on certain motions requiring leverage at the wrist. Now the only times of inconvenience or pain are in trying to use the wrist with too great force either in pushing or lifting.

"Improvement is still taking place, so that I feel that six months more will give me almost a perfect wrist."

Case XVII.—F. U. B., Jr.; clerk; aged twenty years; male. On October 1, 1903, he fell backward in a boat, striking the back of his right wrist against the side of the boat. He says that there was much local tenderness and pain at the time, and all motions of the wrist were painful. There was no ecchymosis.

He was brought to my clinic on April 28, 1904, by Dr. J. H. Wright. At this time there was some thickening about the scaphoid bone and marked tenderness in the anatomical snuff-box. There was no perceptible change in the bony landmarks, but slight limitation of flexion. Extension was limited to about one-half, adduction and abduction were normal. There was decided spasm in extension, and pain if any motion was forced beyond the degree easily obtained by active extension. It chiefly interferes with him in pushing, as in lifting on the arm of a chair when he rises from a sitting posture, or pushing open a heavy door. It hurts him to twist the wrist. The X-ray in this case shows a fracture of the right scaphoid at the junction of the middle and proximal third.

The X-ray suggests that there are three fragments, but only





two can be positively affirmed From the X-ray it is impossible to tell whether union has actually occurred The other scaphoid shows no departure from the normal Operation on April 30, 1904 Ether Dr H M Chase assisting

A longitudinal one half mch incision was carried through the posterior annular ligament of the wrist between the long extensors of the wrist and the extensors of the fingers The upper end of the incision was just at the edge of the lower end of the radius Retraction exposed the radial surface of the scaphoid bone There was an excess of synovial fluid in the joint, although no distention With slight abduction a transverse fracture was seen across the articular surface of the scaphoid bone at the junction of the middle and lower third When the wrist was moved, it was observed that the two fragments moved separately, though to a very slight extent The ligamentous attachments of the proximal fragment to the dorsal ligaments of the wrist and to the semilunar bone were divided with a tenotome A blunt dissector was introduced into the fissure between the two fragments and the proximal fragment torn from its anterior attachment and delivered through the wound A few crumbs of bone adhering to the anterior ligaments were then removed with the scissors, and a small rice like body which was free in the joint also removed. The free surface of the distal portion of the bone which still remained in the joint had the appearance of a recent fracture, except that the surface was more pale and smoother and seemed to be covered with synovial membrane It did not bleed freely

The ligaments divided by the incision were not stitched together because they seemed to approximate closely enough without stitches. A subcutaneous silkworm gut stitch was passed through the lips of the skin wound, but was not tightened. This was done to allow the escape of oozing blood and synovial fluid from the wound.

The patient had a comfortable night, very little pain, and did not require morphine. The subcutaneous silkworm gut stitch was pulled tight the following day

May 3 Wound examined Slight swelling of the wrist and superficial redness Temperature, 995° F, pulse, 100 No pain

May 7 No sepsis Splint shortened to metacarpophalangeal joints

May 9 Fingers move perfectly without pain, and wrist,

though still slightly swollen, is not tender. Fifteen or twenty degrees of active motion without pain. Splint reapplied.

May 26, 1904. Considers wrist better than before operation. Still spasm in extension but not so marked. Flexion within twenty degrees of normal. Extension forty-five degrees. No pain in ordinary use unless motions are forced.

October 23, 1904. Perfectly satisfactory wrist; does not interfere with work or gymnasium exercises. No tenderness in scar or in snuff-box. Extension within ten degrees and flexion within five degrees of normal. Slight tenderness, but no spasm, when forced motions are made. Snuff-box feels smaller than normal.

CASE XVIII.—C. M.; yacht rigger; aged thirty years; male. Came to Massachusetts Hospital, April 15, 1904, for treatment of secondary syphilis. Incidentally, he called the attention of Dr. R. B. Greenough, under whose charge he came, in the Genito-Urinary Department, to his right wrist, which gives him a good deal of annoyance.

He said that in the winter of 1897 he was skating fast and ran into another man, so that his flexed (?) wrist caught the blow and was bent forcibly between his own chest and the body of the individual who ran into him. He did not go to a doctor, but applied liniment to the wrist for two months, and then went to work. He has continued at work steadily until two days ago. The wrist had been practically well until a week ago. He has always had limitation of motion, but no pain. He does not attribute the recent soreness of his wrist to any especial injury.

The symptoms were so characteristic of fracture of the scaphoid that Dr. R. B. Greenough called my attention to it, and an X-ray confirmed the diagnosis. There was the characteristic swelling and tenderness over the scaphoid bone, particularly in the snuff-box; all extreme motions were painful, and extension beyond fifteen degrees was prevented by involuntary spasm. The wrist could be flexed about two-thirds the normal amount before it gave pain.

The X-ray shows a transverse fracture of the scaphoid in its middle portion, with very little separation of the fragments. There is little secondary change about the edges of the fracture, which exactly resembles a recent case. There seems to be no attempt at callous formation. The scaphoid of the other wrist shows no sign of a fault in its bony structure.

FRACTURES OF THE TARSAL BONES 1

BY DANIEL N EISENDRATH, M D,

The importance of the early diagnosis and the institution of the proper treatment of fractures of the tarsal bones is well recognized at the present time. Prior to the routine use of X-ray pictures by progressive surgeons, injuries of these bones were thought to be comparatively rare, and many of the cases were treated as severe sprains, etc. In 1894, Gaupp (Beiträge air klinische Chirurgie, Vol 'u) was able to collect sixty cases of fractures of the astragalus. In looking over the literature of the subject, the writer was surprised to find few cases relatively of fractures of the other tarsal bones reported.

It is only within recent years that we have begun to diagnose fractures of the astragalus and calcaneus, and I shall attempt to show by the report of some cases the necessity of making such a diagnosis as early as possible

Injuries of the other tarsal bones are so rare that I shall confine this paper to the consideration of fractures of the astragalus and os calcis

Surgical Anatomy —The principal points of interest in the surgical anatomy of these two bones are that the astragalus, through its articulation with the tibia and fibula, bears the entire weight of the body, with the aid of its fellow of the other side. This portion (trochlea) corresponds to the body of the bone, and in falls upon the feet one can see how it is caught between the os calcis lying beneath it and the malleoli, and thus crushed. The neck of the astragalus joins the body with the head (the latter articulating with the scaphoid), as can be seen in an X-ray of a normal foot (Fig. 1). This

¹Read at the annual meeting of the Western Surgical and Gynzeco logical Association December 28 1904

narrow neck of the astragalus is the most fragile part of the bone, and hence the most frequently broken.

The os calcis placed beneath the astragalus assists it in supporting the weight of the body, and like it is subjected to a crushing force in falls from a height.

In addition, it has attached to its tuberosity the powerful tendo-Achillis, which plays a great rôle in producing fractures of this bone. The astragalus and calcaneus are firmly bound to the tibia and fibula, to the other tarsal bones, and to each other by powerful ligaments, so that at times a force may tear such a connecting band of fibres, or cause these structures to tear away a portion of the bone itself.

Mechanism.—Fractures of the astragalus and calcaneus may be produced in one of six different ways, given in their order of frequency:

- I. Compression fractures. These form the larger number of the cases. They occur, as is shown in Cases I, II, and III, reported below, by the patient falling from a height and striking upon the ground, so that the sole of the foot receives the major part of the weight of the body. The latter is transmitted to the astragalus and os calcis, which are wedged in between the bones of the leg and the surface struck, and are crushed or compressed, so that they must break. Such compression fractures are frequently associated with fractures of the malleoli, or with a dislocation of the astragalus. The plane of fracture varies. It may be horizontal, vertical, or oblique. There may be simply a division of the bones into two large fragments, or they may be so splintered as to be scarcely recognizable.
- 2. Fractures of the neck of the astragalus following sudden dorsal flexion of the foot. In this variety the line of fracture is in the frontal plane, the anterior edge of the tibia impinging upon the neck, and thus cutting its way through. Such fractures are frequently associated with a fracture of the inner malleolus.
- 3. Fractures of both astragalus and calcaneus following forced supination or pronation of the foot. These are in all



Fig. 1 -- \rac{1}{ra} of normal foot F F bula T Tabus 1 Astragalus 2 Os Calcis
3 Scapbud 4 Cubo d 5 Cune form

probability due to the fact that the interosseous ligaments have in many instances greater resisting power than the bones, and probably pull the bones apart, a variety of tearing fracture so well illustrated in the next method

4 Fractures of the os calcts which result from forcible action of the muscles of the calf. In this variety the os calcts, as in Cases IV and V, is most frequently fixed, and the sudden contraction of the powerful gastroenemius and soleus muscles really pulls the tendo-Achillis from its attachment to the tuberosity of the os calcis, or carries a portion of the latter with it (Fig. 5)

5 Crushing fractures In this variety the other tarsal bones are also involved It follows such accidents as being run over, etc

6. Gunshot fractures All of these, with the exception of the last two, may be simple fractures, with or without noticeable displacement of fragments

In many cases there is no important injury of the soft parts, the latter being usually found more or less contused. In other cases the fragments may penetrate the skin, or may so press upon the skin as to cause secondary necrosis, the prevention of which is of the utmost importance.

Diagnosis —For the sake of brevity, I shall mention the symptoms and diagnosis together, as follows

- 1 Marked swelling of the ankle-joint This is present in both tarsal fractures and in sprains of the ankle, but is more marked in the former
- 2 Obliteration of the normal depressions below and behind the malleoli This is also more marked in fractures of the astragalus and os calcis (Fig. 2)
- 3 Crepitus and abnormal mobility These can rarely be elicited, and but little reliance placed on them
- 4 Dislocation of fragments Such a detached portion may at times be felt beneath the malleoli, or, as in Cases IV and V, just above the tuberosity of the os cales (Fig 5) If felt and recognized to be a part of one of the tarsal bones, this sign is of the greatest value.

- 5. Lowering of the malleoli through diminution in thickness of the astragalus or os calcis. This is very seldom sufficiently marked to be of value, on account of the swelling.
 - 6. Shortening of the foot when found is of great value.
- 7. Abnormal positions of the foot, such as pes valgus or pes varus, if fixed, are also of confirmatory value.
- 8. X-ray examination. This has been adopted as the most accurate means of diagnosis. In every case one should, however, compare the picture of the injured foot with an X-ray of the normal one.
- 9. History of injury is of great value, as it so frequently follows falls from a height.

To sum up, the following are of the greatest value in making a diagnosis of fractures of the tarsal bones, viz., palpation of a fragment, pes valgus or varus traumaticus, the X-ray examination, and the history of the case.

Treatment.—I. In Simple Fractures without Displacement. In these the foot should be immobilized at right angles, best of all in a removable cast, well padded around the ankle and heel. Massage should be begun on the third or fourth day, in order to reduce the peri- and intra-articular effusion, and prevent atrophy of the leg muscles. The cast should be worn for eight weeks, and at the end of this time the patient gradually permitted to put his weight on the foot. Convalescence may be delayed, as in many cases of simple sprain, by the presence of a flat foot (pes valgus traumaticus) following the injury. The pain and discomfort caused by this condition can be quickly relieved by a suitable steel insole.

2. In Simple Fractures with Displacement. If there is the least danger of secondary necrosis of the skin through a fragment impinging on it, it is best to convert the fracture into a compound one, taking extraordinary pains to secure aseptic surroundings, etc. If the fragment lies laterally, it can be easily removed. If it lies behind the ankle and is complicated by detachment of the tendo-Achillis, the latter should be sutured, as in Case IV, to the body of the os calcis. If either the astragalus or os calcis are so badly splintered as to render



Fig. 3—Outlines of normal ankle and of ankle after fracture of the tarsal bones Note how depressions are marked in normal (right) ankle and are obliterated in pathological (left) ankle.

their retention impossible, they may be removed without marked loss of function in the foot

3 Compound, Crushing, and Gunshot Fractures of these Bones One should be guided by the same rules as apply elsewhere in the treatment of such injuries of the extremities

Case I - Compression Fracture of Os Calcis, Secondary Necrosss of Skin. Acute Septic Infection. Amputation of Leg -1 L, engaged as painter in the Stewart Building, of Chicago, was working at the level of the eighth floor of the elevator shaft, when his scaffolding was struck by a neighboring elevator cage during its ascent, and patient was thrown to the bottom of the shaft, a distance of eighty feet. He stated that he had tried to grasp some of the ironwork of the floors when falling, and this prob ably broke to some extent the force of the fall He fell directly upon the sole of the left foot, and was conveyed to an adjacent hospital I did not see this patient until the second day after the injury Prior to that time the treatment had consisted of simply placing the limb on a splint, immobilizing it. No effort had been made to disinfect the skin. When seen by me on the second day after mury, his temperature was normal, the surround ing tissue around the ankle joint was enormously swollen, and there were evidences of deep seated hæmorrhages. The foot was so painful that it was impossible to make any examination, and an X-ray was not at my disposal I was unable to get any crepitus by gentle manipulation. The surrounding skin was disinfected, and the patient placed on long splint with foot at right angle Suddenly, upon the eighth day after the injury, the patient's temperature, which had been normal up to that time, rose to 103° F, pulse, 140, and there were local evidences of an acute infection Amputation was advised on account of the severity of the infection, and proved to have been the wiser plan Examination of the amoutated limb should that there was an extensive infection of the cellular tissue of the entire foot and lower third of the leg There were also evidences of extensive contusions of the soft parts, the os calcis was broken into many pieces, and there was a slight chipping of the cartilaginous surface of the astragalus. There were no fractures of the malleoli, and the patient made an excellent recovery

This case illustrates how compression fractures of the os calcis arise, and shows the importance of making a diagnosis of the condition at as early a time as possible, in order to avoid what must have undoubtedly been the chief etiological factor in producing the sepsis in this case, and that is the secondary necrosis of the skin through impingement of the fragments upon it. Had this case been recognized at once as one of compression fracture of the os calcis, and a careful search made for fragments which might interfere with the circulation of the skin, I have no doubt that we could have avoided the unfortunate necessity of amputation.

CASE II.—E. W., aged forty-eight years, was admitted to my service in the Cook County Hospital with a diagnosis of a severe contusion of the foot and sprain of the ankle-joint, having fallen forty feet from a shed and landing on his feet. Examination showed the enormous swelling around the ankle-joint and obliteration of the depressions which normally exist in front, below, and behind the malleoli. We were suspicious, on account of the severe pain and the enormous amount of swelling, of a fracture of the os calcis or astragalus, and an X-ray was taken. It showed, as can be seen by reference to Fig. 3, an extensive comminution of the os calcis, confirming our previous suspicions. The skin of the foot and leg was carefully disinfected, and the limb placed in a removable cast, which was left on about four weeks. From the second week on massage was given, and at the end of the fourth week passive motion of the ankle-joint was begun. The patient was advised to use the cast for another month, being allowed to place a gradually increasing amount of weight on the limb at the end of six weeks.

This case illustrates the value of early diagnosis of such fractures, and the typical treatment as has been carried out by the author.

Case III is the case of Dr. Sidney McLeod, of South Chicago, who had heard of my interest in this class of cases, and was kind enough to send me X-rays of this Case III, and also of a case similar to my Case IV.

Case III.—G. G., aged thirty-five years; laborer; fell from the back porch of a second story, lighting upon his feet. Dr.

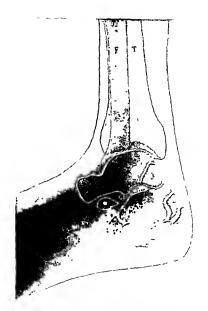


Fig. 3—Illustrates Case III Compression fractures of the astragalus and os calcis \ote the two fragments of the astragalus (a) and the communition of the os calcis (c)



FIG 4—Illustrates Case III Compression fracture of os calcis a Astragalus c Fragments of os calcis outlined in white, the heavy white lines are the spaces between fragments

McLeod found great discoloration, crepitus, and the other usual signs of fracture. He placed the foot in a cast after the swelling had subsided. A shargraph taken six weeks after the fracture is shown in Fig. 4, and illustrates again the same class of fracture as is shown in Case II of my own series, namely, a splitting of the os calcis into a number of fragments, the planes of fracture being diagonal or oblique to the long axis of the bone.

CASE IV—Mrs C V A, aged fifty two years, on October 20, 1903, was getting out of her carriage, and had one foot on the step of the latter and the other (injured one) on stepping stone, when her horse, which was headed south, was run into by a runaway horse. The shaft of the Stanhope buggy to which this second horse was attached ran into Mrs V A's horse, and knocked it over. In falling, her horse threw her backward and fell directly upon her foot and leg. She was wearing a French heeled shoe, and her foot was held as in a vise between the stone and a low circular iron fence to the north of it. She states that as soon as the horse fell upon her, she experienced an excrucating pain in the left heel, and then fell backward into the grassplot. She was referred to me by Dr. M. L. Goodkind, with the diagnosis of a fracture of the os cales.

Upon examination, patient was unable to extend foot Just above the heel there was a sharp projection, which felt firm, like a fragment of bone. It was just beneath the skin. The latter was very thin over it. A diagnosis was made by both Dr. Goodkind and Dr. Schram and myself of a fracture of the os cales. Our theory was that the foot had been caught so as to fix the heel, and her fall backward had caused a fracture by muscular violence.

Operation, on October 22, 1903, at Chicago Baptist Hospital After most thorough disinfection, and with Esmarch applied, an incision was made from the junction of the lower and middle one third of the leg along its median posterior aspect to the lower border of the best. The forganch which had projected was found to be a portion of the os cales, about half an inch thick, which had been pulled upward by the tendo-Achillis and tilted upon edge. It was also found that the tendo-Achillis had been torn loose from this fragment with the exception of its posterior edge. The foot being forcibly extended by an assistant, the small fragment of the os calcis was sutured to the main portion of the bone by mattress sutures of kangaroo tendon (U and L of Fig. 5).

The ends of these sutures weré then passed through the lower border of the tendo-Achillis, and the latter brought somewhat closer to the posterior aspect of the os calcis than normal. In addition, it was more firmly sutured to the periosteum of the main fragment of the os calcis by a number of sutures of medium catgut. Normal temperature followed operation. First change of dressings on November 3, 1903. Primary union of cutaneous wound. Silkworm-gut sutures removed. Limb again placed in plaster cast, with foot in extreme extension.

The wound healed by first intention, and the functional result has been as nearly perfect as could be wished for. She is able to extend and flex the foot as fully as on the normal side.

This case illustrates the importance of making a diagnosis of a tearing-off of a portion of the os calcis, on account of the danger of secondary necrosis over the point where the fragment impinges on the skin. Secondly, the treatment instituted here is, to my mind, the ideal one, when seen early enough by the surgeon, or even at a later period. I would, however, advise against converting such a fracture into a compound one, that is, cutting down upon the point of fracture and suturing the fragments with kangaroo tendon or some other material which will hold the bones together for a sufficient length of time, in those cases in which there is no fragment close under the skin, and in which extension of the foot brings the fragments closely together, as well as in that class of cases where aseptic surroundings cannot be secured. Unfortunately, I was obliged to take the patient to a hospital where there was no X-ray apparatus, so that it was impossible to secure a picture of the condition before operation, and the diagnosis was made entirely upon the palpation of a fragment projecting just above the tendo-Achillis, and immediately under the skin. Through the kindness, however, of Dr. McLeod, I am able to give an exact reproduction of the conditions existing in my patient before operation, owing to the fact that he was fortunate enough to secure an X-ray of an almost identical case (Fig. 6), as follows:

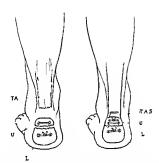


Fig. 5=Method of suturing fragments and tendo-Achillis | Case IV | TA | Tendo-Net be ore suturing | TAS | Same after uturing | U | Upper fragment | L | Lo | er fragme

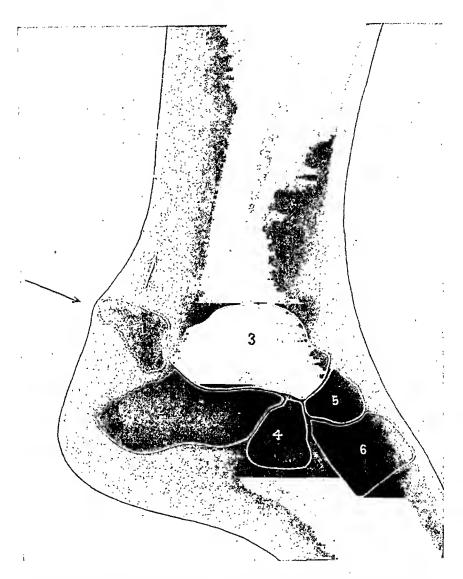


Fig. 6.—Illustrates Cases IV. and V. Tearing fracture of os calcis when heel was fixed. White arrow indicates direction of traction of tendo-Achillis. 1. Upper or torn-off fragment. 2. Main portion of os calcis. 3. Astragalus. 4. Cuboid. 5. Scaphoid. 6. Cuneiform.

371

Case V -Fracture of Os Calcis by Muscular Contraction. causing a Tearing off of a Large Fragment of the Os Calcis from the Main Portion of the Bone -Mrs R, aged sixty-two

years, while walking on a sidewalk, stepped on a rotten board, allowing the heel to go through it with practically no resistance She fell forward, throwing all of the body-weight on the ball of the foot When first seen by Dr McLeod immediately after the accident, the detached fragment was almost through the skin She would not consent to operation until two days had elapsed. when an area of skin as large as a quarter, lying just over the fragment, became necrotic She was taken to the South Chicago Hospital, where the X-ray shown in Fig 6 was taken Dr Mc Leod made a straight incision over the tendo-Achillis and os calcis brought the two fragments of the os calcis together with an wory spike, reinforced by two heavy sutures of catgut. In order to suture the skin, it was necessary to cut away necrotic tissue Good bony union resulted, but the tendo-Achillis became some

what necrotic, but the final result has been satisfactory

TECHNIQUE OF EXPOSURE OF THE SPINAL CORD AND CANAL; OSTEOPLASTIC RESECTION AND LAMINECTOMY.

BY WARREN STONE BICKHAM, M.D.,

OF NEW YORK,

Surgeon to Manhattan State Hospital, New York; Assistant Instructor in Operative Surgery, College of Physicians and Surgeons (Columbia University), New York; Instructor in Surgery, New York Post-Graduate Medical School.

THE object of the present paper is to discuss four aspects of the above title: The General Considerations of the Osteoplastic Resection of the Spine and of Laminectomy, and their Relative Values; The Features common to both Operations; The Technique of Osteoplastic Resection of the Spine; The Technique of Laminectomy; and under these four headings the subjects will be taken up in order.

Four of the drawings used to illustrate the present text have been modified from standard and acknowledged sources; one has been taken from the skeleton, and eight have been made from cadaveric operations.

I. The General Considerations of the Osteoplastic Resection of the Spine and of Laminectomy, and their Relative Values.—In an osteoplastic resection of the spine, a composite flap, consisting of skin, fascia, one or more spinous processes, a set or more of corresponding laminæ, and connecting ligaments, is partially excised en masse, with the constituent parts adherent, and temporarily turned backward and upward, hinging upon its own ligaments, thus exposing the portion of cord or spine involved, and is finally dropped back into its normal place at the conclusion of the operation, with practically all of its structures present and in natural relation. The soft parts are at no time detached from the spines, and only partly and temporarily detached from the laminæ.

¹ Read before the Surgical Section of the New York Academy of Medicine, December 2, 1904.

In the operation of laminectomy, or laminectomy, as it is variously called, the spinous processes and lamine, with connecting ligaments, of two or more vertebræ, are completely freed from surrounding structures, excised, and permanently discarded. Where, as has occasionally been done, the spinous processes and laminæ are temporarily preserved in warm normal salt solution and replaced in sifu at the end of the operation, the procedure is not, strictly, a laminectomy, but becomes a form of osteoplastic resection without all the good points of the latter done in a typical manner.

In performing laminectomy, an attempt at least, should always be made to do the operation subperiosteally, unless there be some pathological contraindication. Many surgeons, however, never attempt to free the spines and laminae of their periosteum before their excision, and in the majority of cases where it is undertaken, it may be safely said that the subperiosteal feature of the operation is carried out so imperfectly as to scarcely amount to a subperiosteal method at all so great are the difficulties of preserving that membrane in clearing these small and irregular bones. In the osteoplastic resection there is no indication to work along subperiosteal lines.

The actual opening in the spine may be of practically the same size and shape in both operations, but the tendency is to form a narrower bony opening in laminectomy, and, of necessity, the field for manipulation is more contracted than in osteoplastic resection, owing to the much nearer approximation of the walls of the wound in the soft parts

As to difficulty of execution, when one has practised both operations equally, no appreciable difference in the difficulty of technique, worthy of a determining consideration, is experienced

It is not open to question that the laminectomy leaves a weaker spine thin does an osteoplastic resection, for the latter leaves, practically, an intact spine, while the former leaves a spine minus as many spinous processes and lamine, with their connecting ligraments, as have been cut out. Just how much

weaker laminectomy leaves the spine it would be hard to calculate; but it is self-evident that a whole spine is better than part of a spine, even if only one-quarter or one-third of two or three vertebræ have been permanently removed, and although the bone thus represented be replaced by fibrous tissue, or partly fibrous and partly bony. It is known that patients have sometimes not been able to sit upright, or to hold their heads up, after laminectomy. And many writers advise the wearing of a spinal support for some time after a laminectomy, which would indicate their belief in its need as an adjuvant to counteract the reduced strength of the column.

Weighing all considerations involved in the selection of one or the other method of approach, the choice of operation should, in the opinion of the writer, be unquestionably given to the osteoplastic resection, as an altogether more surgical procedure,—saving to the individual, as it does, practically all of his structures, all save one spinous process,—leaving, after union, an almost intact and necessarily stronger spinal column; affording a freer and fuller field for inspection and manipulation at the time of operation; furnishing greater subsequent protection to the spinal cord, and most probably furnishing also greater immediate protection to the cord by reducing, in shutting off the spinal canal, the chances of intraspinal infection in the event of non-primary healing.

As matters stand at the present day, and in view of the recent facilities for doing an osteoplastic resection, the view held by the writer is that in cases where the conditions will admit of an osteoplastic resection, the surgeon is not justified in performing any other operation for the exposure of the spinal cord or canal, and that, therefore, the mode of approach in such cases is not a matter of choice, but of plain indication. As the positions of the saw-cuts are practically the same in osteoplastic resection and laminectomy, it is hard to see where laminectomy would ever be indicated in preference to osteoplastic resection. Though such may be the case, no such specific instance occurs to one at the present time, except, possibly, in a rare case where the main object of the operation would be to permanently

remove, for pathological growth, the site of bone involved in a laminectomy,-or possibly in a case of great comminution of the spines and laminæ (and in such case the operation would be atypical),-or where traumatism of the soft parts had left no field for the U shaped incision of an osteoplastic resection. any of which possibilities would be encountered only most rarely Whenever laminectomy is elected in preference to osteoplastic resection, there being no special indication for the former, the only partial justification there would seem to be for the performing of laminectomy would be that it be done subperiosteally, and, as already mentioned, there are those who feel that a subperiosteal laminectomy is very rarely accomplished, even when definitely undertaken by the skilful

In spite, however, of these favorable aspects of osteoplastic resection, there is no doubt but that many more lami nectomies than osteoplastic resections are still done. In the last editions of two of the most generally read works upon operative surgery published abroad not only is osteoplastic resection of the spine not described, but not even mentioned and no method of exposing the spinal cord and canal is given

except the comparatively old fashioned laminectoms

It would seem that the explanation of this is that the technique of osteoplastic resection of the spine is so little under stood, that so many operators, satisfied with laminectomy, have not convinced themselves that osteoplastic resection is better, proving to themselves the ease of this seemingly difficult opera tion by its performance several times upon the cadaver and that the mechanical advantages afforded by Hartley's preliminary excision of the spinous process immediately above the flap, and the use of Doyen's saw, are not more generally known

As far as the writer is personally concerned, he has done several laminectomies upon the living, and a number of osteoplastic resections, as well as laminectomies, upon the eadaver, and, with his present knowledge, he feels that the interests of the patient are better conserved if he be deprived of no appreciable part of his spinal column, and that the general surgical indications are best met by the osteoplastic resection. He did

not then do the osteoplastic operation for two reasons,—first, because of not knowing of a satisfactory instrument with which to make such a bone section; and, secondly, because of having no knowledge of the preliminary excision of the spine above the flap, without which the contiguous spines must interlock and prevent the satisfactory turning back of the flap, both of which difficulties are now readily overcome.

Before considering and illustrating the operations of osteoplastic resection and laminectomy in detail, there are aspects of the technique which are common to both operations and of a fundamental importance to their performance, and which will, therefore, be first mentioned and pictured as briefly as consistent with their understanding.

- II. The Features common to both Operations.—(I) Preparation of Operation-site.—The region is shaved, whether visible hair be present or not, and is made aseptic by the special antiseptic measures of the individual operator, the patient coming to the table with the part protected by dressings applied after the preliminary preparation, the final preparation being made at the time of operation.
- (2) Position of Patient, Surgeon, and Assistants.—The patient lies upon a specially narrow table, in the semiprone position, as nearly upon the front of the chest as the conditions of anæsthesia will allow, being supported by cushions. The surgeon stands at the patient's back throughout most of the operation, passing to the opposite side of the table and leaning over the chest whenever it is more convenient to manipulate from that side. Two assistants are useful, one at the surgeon's side, and another opposite him, on the other side of the table, bending over the patient.
- (3) Anæsthesia.—Nitrous oxide and ether, unless contraindicated for special reasons.
- (4) Instruments and Accessories.—Heavy cartilage knife and medium knife; artery-clamp forceps; dissecting forceps; two pairs of special retractors with teeth blunt and long enough to reach the bottom of the wound; chisel about two centimetres (about three-quarters of an inch) wide;

Doyen saw, Gigli saw, probe with thin flat end, curved heavy scissors for interspinous and interlaminous ligaments, small angular scissors for incising membranes of the cord, two small, toothed forceps for membranes, large and small needle-holders, fine, fully curved needles for membranes, heavy, curved needles for buried muscle sutures, straight needles for skin, plain fine catgut for membranes, twenty day chromic gut for buried muscle sutures, silkworm gut, or silk, for skin sutures, horse hair or catgut for intradural drainage, tubing or gauze for extraspinal drainage, gauze for packing wound, hot normal salt solution for hemorrhage

- (5) Landmarks of Operation—The spinous processes corresponding with the laminæ to be removed should if possible, be very clearly located before beginning the incision. This can always be done in backs of medium thickness, and generally in moderately thick backs upon deep pressure. The transverse processes in the dorsal and lumbar regions and the articular processes in the cervical region should also be located in the case of the osteoplastic resection if it be possible, but often cannot be determined until after the skin and fascri have been incised in the operation last mentioned.
- (6) Manner of Incising Muscles and Aponeuroses—While this is not a major point, attention to the principle in volved will insure a more cleanly cut section in the case of osteoplastic resection, and a more complete clearing of soft parts from the spines in laminectomy than if the principle were not observed. One is familiar with the fact that the spines of a feather may be more readily and cleanly stripped from the quill by cutting from the tobase than by cutting in the opposite direction. Therefore will the section of muscles and aponeuroses be more cleanly and evenly made if made by a stout kinfe wielded in such a manner as to cut into, or towards, the more acute angle formed by the attachment of the muscular or aponeurotic fibres to the parts of the vertebral column, rather than towards the more obtuse angle, and especially is this the case the nearer the spinous processes one approaches. This will sometimes necessitate cutting towards

the head, sometimes towards the sacrum, according to the direction of the fibres at the site of operation, and may require stepping to the opposite side of the table. Practically, two changes in the direction of the incision on either side of the median line will fulfil these indications. It will, therefore, be seen that it is not advised to cut from skin to bone or even from fascia to bone, at one stroke, but rather with three,—one through skin and fascia and two through the musculo-aponeurotic structures,—retracting between each incision, such a procedure furnishing a wound with less raggedly cut walls (Fig. 1, A, B).

(7) Manner of Clearing Soft Parts from Spines and Laminæ.-This, as usually done, is accomplished by the combined use of cartilage knife, periosteal elevator, and raspatory, with more or less satisfactory result. The cleaning of the bones may, however, be much more thoroughly done, and by a single instrument, by using an ordinary chisel. When the incisions have been carried fully to the bones, a knife is no longer necessary. Through the incision made by the knife, a chisel (about two centimetres, or about three-quarters of an inch, wide) is carried directly to the depth of the wound, guided, if necessary, by the surgeon's left index-finger, and so directed that its bevelled edge will be turned away from the soft parts to be pried from the bones. In osteoplastic resections the blade of the chisel rests against the transverse processes in the dorsal and lumbar regions, and against the articular processes, partly covered by muscles, in the cervical region, and, from these as fulcra, the soft parts are levered off towards the spines (Fig. 6, D). In a laminectomy the chisel-blade rests against the spinous processes, and from these as fulcra the soft parts are pried out of the bony groove towards the transverse processes in the dorsal and lumbar regions, and articular processes in the cervical (Fig. 10, C). This use of the chisel is exceedingly satisfactory, its sharp edge easily and thoroughly removing all the soft parts, and probably leaving a cleaner bony bed for the saw than is accomplished in any other way. This result is not so well secured if the bevel of the chisel is turned towards the parts to be removed.

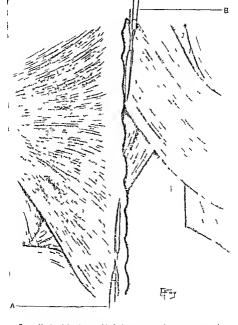


Fig. 1—Muscles of dorsal region of back sho main riof ing mulcula a diagnounce of these. A line is not lower part of traper as do ward in he acu ange for red by a force with the spine. B fine in of undel ing homboid muscles unwif in the acute angle formed by the ribble with the spine. (Mod fed from Fig. A han on

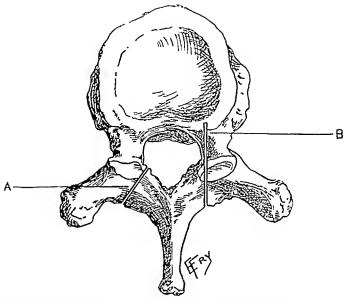


Fig. 2.—Dorsal vertebra, showing results of incisions begun at relatively corresponding sites and passing through laminæ in different directions. A, Proper section, cutting lamina at right angle to its surface and entering spinal canal; B, improper section, passing through lamina parallel with general direction of spinous process and entering pedicle of vertebra and on into body. (Modified from Quain's Anatomy.)

- (8) Manner of Dividing the Laminæ-This step, in either operation, is of paramount importance, and the manner of its performance, as far as the actual making of the saw-cut is concerned, is the same, whether the operation be osteoplastic resection or laminectomy And the principle is also the same. as far as the direction of the section is concerned, no matter with what form of instrument the division of bone be made This important principle is that the instrument should have its edge placed upon the laming at or a little to the outer side of their centre, and be made to cut its way through the laminæ strictly at a right angle to the general direction of their surfaces (Fig 2, A) Even if the edge of the bone-cutting instru ment enter in about the same site as just described, and the section be made, as so often done by beginners, parallel with the general direction of the spinous processes, the chances are that the section will pass on into the solid articular processes and pedicles, and, if continued, on into the bodies of the vertebræ (Fig 2, B) The writer has observed the marked ten dency to this serious error upon the part of students, who really often do not appreciate their difficulty until it is pointed out to them upon the skeleton The error, once made, is hard to correct, it is absolutely impossible to go ahead upon that straight line, it is hard to start a new saw cut, and often, much chagrined, one is at a loss to know what to do and is tempted to chisel his way through. It is better, however, to persevere with the saw until the groove of a new cut is made in the right direction
- (9) Instrument for Making the Bone sections—Doyen's saw, in the judgment of the writer, is the instrument, far excel lence, for all bone-sections which are necessary in exposing the spinal cord and canal. It is useless to more than mention the miny means that have been resorted to to divide the parts of the vertebrie, such as excision of the spines with bone phers, fol lowed by cutting away the laminae with bone-cutting forceps, or sawing them off with Gigli or chain saw, dividing the lamine directly by bone-cutting forceps, one blade of which has been thrust through an interlaminous ligament, cluselling

through the laminæ in parallel lines (at the cost of much jarring and irregular division); the use of small trephine-openings, the intervening laminæ being cut away, and the use of the Hey saw. Doyen's saw is, practically, a Hey's saw with an adjustable guard, and while it seems a rather unsatisfactory instrument for the purpose intended by its author (namely, cutting through the skull between the burr-openings in cranial work), it is an almost perfect instrument for work upon the spine. The writer has had no experience with motor saws in this connection, nor seen any at work upon the spine, and while inclined, on principle, to that form of saw, he knows at present of no instrument more admirably adapted for special work than the Doyen saw for spinal sections (Fig. 3).

- (10) Hartley's Preliminary Excision of the Spinous Process immediately above the Flap in Osteoplastic Resection of the Spine.—While this procedure is not common to both osteoplastic resection and laminectomy, and consequently does not strictly come under this division of the subject, yet it is a fundamental feature of the osteoplastic resection, and its general principles will, therefore, be briefly described here. difficult to see how an osteoplastic resection is possible without first removing the spine immediately above the flap to be turned back. Most markedly in the dorsal region, and even in the cervical and lumbar regions, will any lower spine quickly become interlocked with the one just above if an attempt be made to turn it backward and upward. So that without the preliminary excision of the spine above, the flap below can only be turned backward and upward by main force, and often a considerable degree of force is necessary, during the exercise of which bony portions of contiguous vertebræ may be broken, or other damage done. This preliminary step to the main operation may, therefore, be regarded not only as a most useful feature, but almost as a sine qua non of the operation as a whole. The manner of its execution will be described more in detail under the osteoplastic resection.
- (11) Control of Hæmorrhage.—The three stages at which hæmorrhage is apt to be encountered are: after making

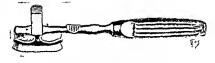


Fig. 3 -Doven s saw the guard set at 10 mm (2 m) (Mod fied from The Kny Scheerer Company s Catalogue)

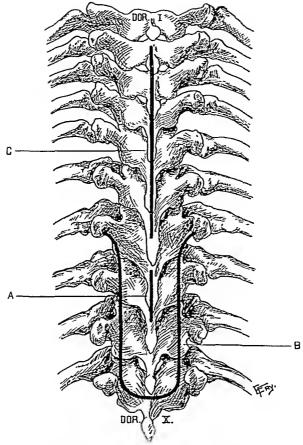


Fig. 4.—Lines of skin incisions in relation to underlying bones in osteoplastic resection and in laminectomy. A, Line to remove seventh dorsal spine in Hartley's preliminary operation of excising the spinous process of the vertebra immediately above those forming part of the osteoplastic flap; B, modified U-shaped incision outlining the osteoplastic flap for turning back the eighth and ninth dorsal spines and laminæ; C, line of incision for laminectomy of third, fourth, and fifth dorsal spines and laminæ. (Drawn from the skeleton.)

the skin and fascial wound, during the incision of the muscles of the back, and after opening the spinal canal, in removing or incising the vascular fatty areolar tissue from around the membranes Hæmorrhage from visible vessels encountered prior to reaching the spine should be controlled by artery clamp forceps, followed by ligature or torsion General oozing and hemorrhage from undetectable sources (which form the chief bleeding) should be arrested by gauze packing, or by flushing with hot normal salt solution, and by alternately working upon the two sides of the wound Intradural bleeding from the vascular fatty areolar tissue surrounding the cord, and which is chiefly venous, should be stopped by pressure with gauze held in forceps

III The Technique of Osteoplastic Resection of the Spine —Two distinct operative steps are here undertaken,—the preliminary excision of the spinous process above the flap and the formation and turning back of the osteoplastic flap The nature of the operation has been briefly described under General Considerations

(A) Preliminary Excision of the Spinous Process immediately above the Osteoplastic Flap (Hartley's Operation) — This preliminary operation may be considered under the following headings Incision, Exposure of Spinous Process, Severing of Supra- and Inter spinous Ligaments, Excision of Spine, Temporary Packing of Preliminary Wound, Final Suturing of Preliminary Wound

(1) Incision -A vertical incision is made directly in the median line, its centre over the spinous process to be excised, and extending in length from the tip, or near the tip of the spine above to the tip, or near the tip, of the spine below (Fig 4. A)

(2) Exposure of the Spinous Process -The above incision is carried through skin and fascia directly onto the spinous process mentioned The lips of the wound are then well retracted, and the spine in question is exposed fully to its base by prying away the overlying and closely attached soft parts by means of a chisel used against the spine as a fulcrum in the special manner described under General Considerations. This freeing having been accomplished, the soft parts are strongly drawn aside by means of retractors, which also serve the part of protectors of the soft parts during the use of the saw (Fig. 5, A, A). A subperiosteal exposure of the spine should be attempted.

- (3) Severing of Supra- and Inter-spinous Ligaments.— These ligaments are now to be divided, both in order to sever this spine from the one below and to prepare a passage for the Gigli saw. This division of ligaments may be made with a knife, but can be better and more readily accomplished by means of curved scissors whose concavity is held upward. Having passed through the supraspinous ligament, the interspinous ligament is divided down to the ligamenta subflava. The spinal canal should not be opened in this procedure.
- (4) Excision of the Spinous Process.—A passage-way having been thus provided, a Gigli saw is carried deeply down to the very base of this spinous process and the entire process removed (Fig. 5, B, B). Care is exercised to avoid making but a partial excision, as the remaining stump may interfere with the turning back of the flap almost as much as though the entire spine were *in situ*. Some operators cut the spine off with bone-cutting forceps; but the use of bone-cutting pliers here, as in many other instances, is unsurgical, removing, as they do, by a crude process of crushing, a part of bone which is much more cleanly and less traumatically cut away by a Gigli or other form of saw.
- (5) Temporary Packing of the Preliminary Wound.— The spine of bone having been removed, the preliminary operation is for the time-being ended. The further use of this wound will be described in connection with the turning back of the osteoplastic flap. Some operators here permanently suture up the wound left by the excision of the spinous process; but it is distinctly best not to do so, as will be evident farther on. This wound should be tightly packed with gauze and temporarily left alone.
 - (6) Final Suturing of the Preliminary Wound.—At the

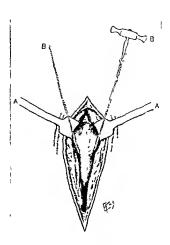


Fig. 3.—Osterplastic resection of the spine. Hattles agree in sare operate in a receiving the game of the settlebra immediately above the flip. 1.4. Accreators in the wind a so-earling as protection of soft parts. B. F. Gigilli saw in positions a recursing the entire spinous process. (Drawn from endawerse operation) Mole—The subjection-lead method is not shown here.

		-@-
		3

conclusion of the entire operation, the preliminary wound is sutured upon the same general principles to be described for the main wound, namely, buried chronic gut sutures to bring the muscle and aponeurous structures together in the space formerly occupied by the now excised spinous process, and silkworm gut, or silk, for the skin wound, no drainage being used (Fig 9, A, A)

- (B) The Formation and Turning back of the Osteo plastic Flap—This, the main operation, will be considered under the following divisions Incision, Division of Muscles and Aponeurosis, Freeing of Laminæ preparatory to their Division, Division of Laminæ and Ligamenta Subflava, Division of Supraspinous, Interspinous, and Interlaminous Ligaments, Separation and Turning back of Osteoplastic Flap, Freeing of Spinal Cord from Extradural Fatty Areolar Tissue and Control of Intraspinal Hæmorrhage, Opening of Membranes, Reposition of Cutaneomisculo-osseous Flap, Deep Buriedsuturing of Muscles and Aponeuroses Skin and Fascial Suturing, Provision for Drainage when Indicated, After treatment, Comment
- (1) Incision—A modified U-shaped incision is used This incision outlines the two sides and lower limit of the composite flap of skin muscle aponeurosis-bone-and-ligament to be temporarily turned back (Fig. 4, B). Its two strictly vertical limbs begin over the lamine of the vertebra whose spine is to be excised, commencing to the outer side of its vertical centre, near the root of the transverse process in the dorsal and lumbar regions, and near the base of the articular process in the cervical vertebrae, and extend on both sides, downward in straight fines, paralfed with the tips of the spinous processes until opposite the tip of the last spine to be included in the resection, here the incisions broadly curve towards the median line, meeting midway between the tip of the spinous process just mentioned and the tip of the spinous process just mentioned and the tip of the spinous process next below. It is very essential that this broad curve should be given to the lower end of the incision rather than that a narrow contracted

curve be made, much of the ease of subsequent manipulations depending thereon. For the purpose, solely, of providing a greater influx of blood into the base of the semidetached flap of skin-muscle-and-bone, a slightly outward curve should be given to the upper ends of the vertical portions of the U-shaped incision. It might be asked how the bases of the transverse processes of the dorsal and lumbar vertebræ and the bases of the cervical articular processes may be recognized prior to the skin incision; in reply to which it may be said that the tips of these processes themselves (transverse and articular) may generally be felt upon firm pressure made upon backs of medium thickness, and, having recognized the tips of these processes, their corresponding bases lie approximately midway between their tips and the median line formed by the apices of the spinous processes. Where the tips of the transverse processes of the dorsal and lumbar vertebræ and tips of the articular processes of the cervical vertebræ cannot be recognized by palpation at all, it may be stated that the tips of the transverse processes of the dorsal vertebræ lie, in the average skeleton, about three to 3.5 centimetres (one and one-fourth to one and three-eighths inches) from the tips of the dorsal spines, the tips of the lumbar transverse processes about four to five centimetres (one and five-eighths to two inches) from the tips of the lumbar spines, and the tips of the cervical articular processes about three centimetres (one and one-fourth inches) from the centres of the cervical bifid spines.

(2) Division of the Muscles and Aponeuroses.—The direction of the incision through the layers of muscles and aponeuroses at the different layers, and the reasons therefor, have been given above under General Considerations. The incision through skin and fascia will, upon retraction, have exposed muscle or aponeurosis, according to the site of operation. The margins of the skin and fascial wound having been retracted and hæmorrhage controlled, the muscular and aponeurotic layers in view are incised in a general direction which will correspond with the acuter of the two angles which their component fibres make with the spine, and the layers below

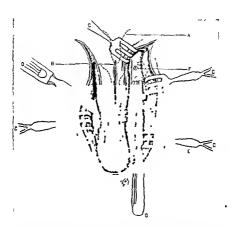


FIG 6—Osteophysic resection of the spine. A A Leastmond dorsal spines. B would of Hartist a priginaman exection of spinous process manufactule, above, flip C C C C retractors of main wound. D chosel agrants transferor processes as fuller in act of pry may soft parts from launing. E limites, F interlaamons signament (transferor than subdivining). G Doyses saw in act of completing section through launine and interlainments of the memit. (Draws from cadastics operation.)

	•	
ν'		

similarly incised Immediately prior to deepening the muscle incision down to the bone, it is advisable to satisfy one's self, by means of a finger introduced into the wound, that the vertical limbs of the U shaped incision are falling well within the bases of the transverse processes in the dorsal and lumbar regions and within the tips of the articular processes in the cervical region. This precaution will insure the coming of the incision down upon the spinal column over the laminæ, which will make the clearing of the laminæ correspondingly easy.

(3) Freeing the Laminæ preparatory to their Division -The gauze packing is now removed from that side of the U which was first incised and packed, by which time the hæmor rhage, which is usually rather free, has ceased While instru-mental retraction should be practised during the latter stage of the freeing of the laminæ, it is not necessary, and is certainly better omitted during the beginning of the freeing, owing to the small amount of room in the wound for finger and chisel At the stage when retractors are used, they should have blunt hooks, to avoid wounding the fingers of operator and assist ants, which are also in the wound, and they should be long enough to reach to the bottom of the incision Proceeding, therefore, at first without retractors, the left index is introduced into the wound until its tip is in contact with the laminæ An ordinary chisel, as mentioned in the Introduction, is now inserted alongside of the already introduced finger, with its edge parallel with the direction of the spines and with the bevel turned away from the parts to be pried from the laminæ, in the manner already described A path for the Doyen saw is thus made over those laming which are to be temporarily turned back,-the chisel being used as a lever,-braced against the transverse processes in the dorsal region against the articu lar and transverse processes in the lumbar region, and against the articular processes in the cervical region, and, with these as fulcra, is made to pry the overlying soft parts from the bony groove formed by the lamma and interlammous ligaments (Fig 6, D) While the major portion of this clearing of the saw bed can be accomplished by manipulating the chisel from the aspect

of the transverse and articular processes towards the base of the spines, a still more thorough completion of the clearing can be secured by withdrawing the chisel, turning it around (so that the bevel is towards the transverse processes), and also using it against the spines, covered by their soft parts, as fulcra, while prying away from the laminæ those soft parts lying nearer the transverse and articular processes. This manipulation is shown in Fig. 10, C, where the principle is used in the laminectomy operation. Not only should the special laminæ and interlaminous ligaments involved in the resection be completed cleared of overlying soft parts, but the lower half of the laminæ above and the upper half of the laminæ below these should also be freed, as it will be necessary for them to accommodate the end of the saw in its excursions. This additional clearing is shown in Fig. 6. When the saw-bed upon one side has been thus prepared, it is firmly packed with gauze, to control bleeding, while the opposite side is being similarly prepared and packed.

(4) Division of Laminæ and Ligamenta Subflava.—The edges of each of the vertical limbs of the wound should be retracted, one at a time, by four special retractors with extralong blunt teeth, the wound thus presenting a rectangular shape (Fig. 6, C, C, C, and a small unlettered retractor). The guard of the Doyen saw is set at ten millimetres (about sevensixteenths of an inch), which will give a sufficient cutting edge to pass completely through the laminæ at any portion of the spine, provided the section be made well within the laminæ proper, and at a right angle to their surface. With the guard thus set it is simply impossible to wound the cord (the cord and spine being normal), as the saw will bind after traversing the bone. As a matter of fact, the guard may be entirely dispensed with; though under such circumstances care is necessary, and the saw must be checked immediately upon the sense of lost, or lessening, resistance, as the last thickness of the laminæ is encountered. One has frequently thus used the saw upon the cadaver without other than the most ordinary precautions, and has never seen injury done in such cases; nor

has he but once ever seen the cord injured by a student during the roughest manipulation, independently of the form of instru ment used for the bone division, so securely is the cord ordinarily protected by its position. The saw, protected by the guard at ten millimetres, should be used until it has cut its way completely through and is stopped by the shoulder of the guard. The sweep of the saw at each stroke should be as full as the length of the wound will allow, and the general cutting edge of the saw should be held as level as circumstances will permit, that the bone section may be made of equal depth throughout as great a length of the wound as can be reached in one position of the saw It is usually impossible to complete the section of one side with the saw in one position, owing to the shape and position of the handle of the saw, as the end of the saw nearer the handle will not travel the full length of the wound quite as satisfactorily as the distal end Fig 6 G, illus trates this principle The surgeon therefore, standing at the patient's back, introduces the saw first into one side and then into the other, using the instrument from below upward and sawing through the lower half of the laming above those to be turned back, as well as through as many of the lamnae to be resected as the teeth of the saw will engage themselves in When division of the upper parts of both sides has been made, the surgeon, unless ambidextrous must walk around the table lean over the thorax of the patient (in his semiprone position), and, saying now from above downward complete the section of those laminæ to be temporarily turned back, as well as of one half of the lamme next below. The depth of the bony section may be tested from time to time by means of the flat end of a specially thin probe This division of one-half of both the laminæ above and below those to be temporarily dis placed is only necessary because unavoidable, as the saw-blade cannot be carried abruptly up to the limit of one lamina and completely divide it without also at least partly dividing a portion of the contiguous lamina (Fig 6, E) But no practical harm is done thereby, as only a very small proportion of these two sets of lamine is divided by the very fine blade of the saw,

and must soon solidify. The ligamenta subflava are also divided by the saw (Fig. 6, F).

- (5) Division of the Supraspinous, Interspinous, and Interlaminous Ligaments.—The lowest one of the spines in the osteoplastic flap, with its corresponding laminæ, is now to be severed from the corresponding intact structures next below, involving the division of the above-mentioned ligaments. These ligaments may be divided with a knife held sidewise, but are more satisfactorily divided by a pair of curved scissors held with their concavity backward (Fig. 7, C). The process of division is aided by grasping the composite flap to be displaced and lifting the lowest spine away from its neighbor next below, thus giving the scissors more room for dividing the V-shaped ligamentous structure formed by the supraspinous and interspinous ligaments posteriorly and the ligamenta subflava to either side.
- (6) Separation and Turning Back of the Osteoplastic Flap.—The detachment or loosening of the resected portion of the spinal column is best accomplished by means of the same chisel used in clearing the soft parts from the bones, and held in the same way, that is, with the non-bevelled edge towards the part to be pried out. Preparatory to thus using the chisel as a lever, the edges of one of the vertical limbs of the wound are retracted by the four special retractors mentioned above (Fig. 7, A, A, A, and a small unlettered retractor), the parts sponged dry with gauze, and the saw-cut brought well into view. The surgeon's left index-finger should be introduced into the preliminary wound through which the spinous process has been removed (Fig. 7, B), carried down to its sawn-off end and adjacent interlaminous ligaments, and held there until the composite flap has been pried out of its site, the tip of the finger greatly aiding in this manœuvre and in determining the progress of the elevation. The chisel is placed in position, with its bevelled side against a transverse process (in the dorsal or lumbar region) or against an articular process in the cervical region, and its edge, with non-bevelled surface towards the spines, engaged in the saw-cut (Fig. 7, D). The composite

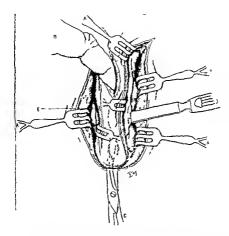


Fig. 7—Osteoplast cresset on of spine. A.A.A. A. Retractors in ma. wound. B. stir. geon a left if a singer i stroduced into prel emistry wound to a din bending bit. of flap C. curved is some cutting interspines and interflain ions ligaments. D. the clintroduced into a silvant and supported against transporting processes at failtre. prin ng out osteoplastic flap. E. oppose tesaw cit. [Chann from enables recoperation].

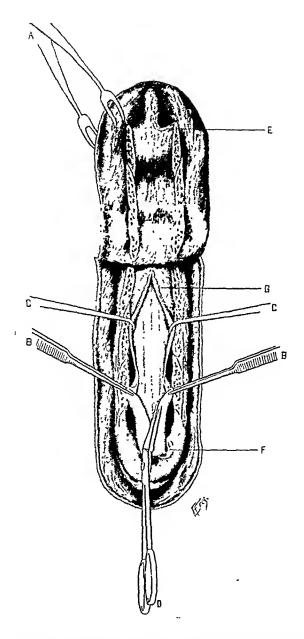


Fig. 8.—Osteoplastic resection of the spine. A, Tenaculum-forceps holding back composite flap; B, B, delicate forceps grasping and elevating membranes and forming a transverse ridge; C, C, tenacula holding apart edges of incised membranes; D, angular scissors used in incising membranes; E, half-button of bone bitten out of lower margin of last lamina in flap by rongeur forceps; F, similar half-button bitten out of upper margin of next stationary lamina below, the two half-buttons forming a circular opening, when in contact, for drainage; G, vascular fatty areolar tissue covering membranes. The stump of the excised spine is shown, in impression, through the turned-back flap. (Drawn from cadaveric operation.)

mass is seized between the surgeon's left thumb and index and steaded and gently drawn away during the prying out process Ordinarily, a single, light, downward pressure of the handle of the chisel will suffice to start the composite flap from its normal site, after which the entire flap can be readily turned back. This is always so if the section of bones and ligaments have been previously made complete, which should invariably be the case, and verified by sounding along the entire line of section with the flat end of a thin probe Should the flap not readily, and without force, start backward, it argues that the section has not been fully made, and there is no alternative but to lay down the chisel and complete the division of bone with the Doyen saw, or of the ligaments holding the last spine and lamina with scissors, as may be indicated, before going on with the levering-out process As soon as the section is felt to be started from its bed sufficiently to get the end of the finger under the tip of the lowest one of the spinous processes, all instruments may be laid aside. With the left index finger still in the preliminary wound through which the spine has been removed, pressing down between the stump of the excised end and the upper margin of the laminæ below, and with the right index under the last spine of the flap, the entire mass is turned backward and upward onto the patient's back (Fig 8, A) The backward displacement of this flap is accomplished in the following way The mass hinges over the stump of the excised spinous process, the interlaminous ligaments serving as the hinge, at the maximum of tension of the parts the upper border of the detached laminæ below is pried downward and outward from under the lower border of the intact laminæ above, and then slightly rides up over the latter in the turningback process This manœuvre does not so fully occur in the lumbar region, and but slightly, if at all, in the cervical region, owing to the different disposition of these lamine and their wider separation from each other. If the line of bone-section have fallen well within the articular processes, the joints of the articular processes will not be opened This manipulation, though exercising some violence upon the structures entering

into the make-up of the interlaminous relations at the hinge, does no permanent harm, as the parts readily drop back into their normal relationship at the end of the operation and undoubtedly soon solidify. The composite flap, once turned back, will generally lie *in situ* without restraint, or may be held so with a light retractor or tenaculum-forceps (Fig. 8, A).

- (7) Freeing of the Spinal Cord from the Extra-dural Fatty Areolar Tissue, and Control of Intraspinal Hæmorrhage. —Having turned back the osteoplastic flap, the window in the spinal column is shown, corresponding in length with the number of laminæ resected, and in width with the distance apart of the saw-cuts (Fig. 8). In some cases the membranes of the cord lie readily within view and touch through the window thus formed, surrounded by a minimum of connective tissue. In other cases a more or less thick layer of vascular fatty areolar tissue may intervene between the bone and the cord (Fig. 8, G). To reach the membranes, this layer must be removed, which is best accomplished by grasping it with delicate forceps and cutting it with fine angular scissors. hæmorrhage which results from this manœuvre, and which may be somewhat marked, is usually readily controlled by the pressure of gauze held in small forceps. The hæmorrhage will be less if this vascular tissue, chiefly venous, be cut accurately in the median line. Upon the removal of this fatty connective tissue the white glistening membranes of the cord are brought into the field. If the object of the operation have been only to expose the membranes, that object is now accomplished. If the cord itself is to be exposed, other steps are necessary.
 - (8) Opening of the Membranes of the Cord.—The most satisfactory manner of incising the membranes which the writer has found is the following: Two pairs of delicate, toothed forceps are taken, one held in the surgeon's left hand and one in an assistant's right hand (Fig. 8, B, B); each of these, on the same level, takes a light hold upon the membranes of the cord about three millimetres (approximately one-eighth of an inch) from the median line of the membranes (making the forceps six millimetres, or one-fourth of an inch, apart), care

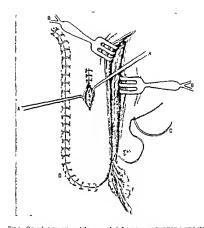
being taken that the membranes alone are grasped. The tips of the forceps are now drawn gently outward and upward, away from the underlying cord, whereby a marked transverse ridging of the membranes is produced at a right angle to the length of the cord. While thus held, this ridge is cut with the points of a pair of small, angular scissors held in the right hand of the operator (Fig. 8, D). Having made an opening in the membranes, the lower blade of the scissors is passed along between the cord and theca and the incision extended to the desired length, the holds of the forceps being shifted as the incision advances, and being subsequently maintained to retract the incised membranes, or the edges of the cut theca may be held apart with fine tenacula (Fig. 8, C, C). Upon the wide retraction of the cut membranes the spinal cord and the exit of the nerve roots from the cord are brought well into view. The special object of the operation, if it involve the cord, is now carried out. The present paper deals solely with the manner of exposing the cord and canal, the various special conditions for which this exposure may have been made not being taken up.

(9) Manner of Dealing with the Incised Membranes—
This will pre-eminently depend upon the nature of the special
operation. All bearings of the operation being favorable, it is
best to close the membranes after the carrying out of the special
object in view. This is done with fine, plain catgut threaded
upon a specially adapted, fully curved needle held in an appropriate needle holder. The margin of each lip of the cut theca
is brought into proper relationship for suturing by being held
by the delicate toothed forceps used in steadying the mem
branes during the incision of its structures. A continuous
suture completely closing the incision is preferable

suture completely closing the incision is preferable
(10) Reposition of the Cutaneomisculo-osseous Flap—
The object of the operation, as a whole, having been fulfilled, the composite flap will often fall back into accurate apposition without any effort to make it do so. It is, however, better for the surgeon to reinsert his left index into the preliminary wound through which the spinous process has been excised and

carry this finger down to the stump of the excised spine (Fig. 7, B), while with his right hand he replaces the flap, thus having a better opportunity to verify the accurate fitting of the This fitting of the structures back into their original relationship should be absolute; and, fortunately, it is easy to determine whether or not it is so, and equally easy to make it so if there seems to be difficulty. This replacement is brought about by manual manipulation alone, the left index in the small wound guiding the parts at their hinge-junction. accuracy of the apposition is verified by exposing the saw-cuts, and seeing that the parts of the laminæ on either side of the section line are on an exact level; and, when this is the case, it will be found that the shelving surfaces of the contiguous laminæ, where the interspinous and interlaminous ligaments were cut, are in accurate apposition, that the spines are in line and on a level, and that the skin margins come easily and evenly together.

- (11) Buried Suturing of Muscles and Aponeuroses.— Having readjusted the composite flap, the soft parts intervening between skin and bone should be brought together by deeply buried sutures (Fig. 9, C). One would give the preference to twenty-day chromic gut, fairly stout, carried upon a fully curved needle. The cut muscles and aponeuroses are brought together in their proper layers and relations in the bite of heavy forceps, and are thus held while being penetrated by needle and suture. Two continuous sutures may be used, each passing from the upper end of one of the limbs of the U-shaped incision above to the centre of the incision below, or interrupted sutures may be applied. It is not practicable to suture together the cut edges of the interspinous and interlaminous ligaments, nor is it necessary, so closely do the parts come together, but the cut ends of the supraspinous ligament may be sutured.
- (12) Skin and Fascial Suturing.—The skin and fascia should have their edges united with interrupted sutures of silkworm gut or silk. A continuous suture of a wound of this shape and extent is not apt to bring the margins so accurately together (Fig. 9, D).



Fit 9—Osteoplastic exection of the spine -1 A. Retractors in § t in inhar, wound above ing buried satures of muscles and superficial satures of skin. B. B. large retractors drawing backskin of main wound. C. line of continuous baried satures of deeper parts. D. has of interrupted superfinal satures. E. intraductal boarse but or catgot dri in Γ extra spinal satured from Coran from cadavers operation.)



(13) Provision for Dramage, when indicated -Opin ions differ upon the subject of drainage,—some advising its use both within the membranes and in the extraspinal wound, and some its non use Unless there were some special contra indications, the preference of the writer would be to com pletely and accurately suture the incised membranes, to shut off infection from without, and the escape of cerebrospinal fluid from within, to introduce, for from twenty four to forty eight hours, an intraspinal but extradural drain of a few strands of horsehair, or catgut, bringing these out between a couple of omitted superficial sutures (Fig 9 E), incor porating them with a strip of gauze placed in the deep muscle wound and leading down to the spine (Fig 9 F), both emerging together from the skin wound Where intraspinal drainage is used, whether it be intra-or extra dural, special provision must be made for it. This is best secured by biting out, with rongeur forceps, a half button of bone from the lower margin of the lowermost lamina in the flap (Fig 8, E), and a corresponding half button of bone from the upper margin of the uppermost one of the intact lamina below (Fig 8, F) so that when the osteoplastic flap is turned back into place, the two half buttons will afford a circular bone-opening for drain age, the drains being conducted thence out through muscles and skin as just mentioned

(14) After treatment—It is concervable, though the writer knows of no such recorded case, that through the excision of a large number of lammae in the operation of laminec tomy, a patient might be broken into two by subsequent rough or imprudent handling, so that it might be well in even osteo plastic resection where the operation has been extensive, to include some form of spinal splint in the final dressing immediately after operation, which could be worn until solidification of the parts had taken place through union as after any other fracture, the patient meanwhile maintaining a strictly horizontal posture. In ordinary osteoplastic resection of average extent, and with the spine normal as to strength the use of a splint would seem superfluous. The writer has never used any

form of spinal support following laminectomy, where the spine is left even weaker than after an osteoplastic resection. If the need of it were felt, following the convalescence of the patient, some form of leather, or leather and metal, support could be worn as long as indicated. Reference has been made to the occasional need of such a support under General Considerations.

(15) Comment.—Both during and immediately following all operations in which the membranes of the cord are opened, the patient's head should be kept lower than the body and the spine absolutely horizontal, in order to lessen the loss of cerebrospinal fluid.

Where the window in the spine has been made too narrow, through the placing of the bone-sections too near together, if more space for manipulation be absolutely demanded, there is no alternative but to bite out a portion of the margin of the opening into the spine, by means of rongeur forceps or bone-cutting pliers. If this be done to a limited extent, although there will be a corresponding gap when the osteoplastic flap is turned back into place, the flap will, nevertheless, be held in position and kept from pressing against the spine by resting upon the margins of the bone-section which have not been thus additionally cut away.

While the normal cord, in a normal canal, is not apt to be injured by any method of ordinarily careful approach, in pathological cases the need of additional care is always present.

When it is necessary to reach the anterior aspect of the spinal canal, the cord must be displaced temporarily to one side by means of gentle retraction. If such retraction should not give sufficient room for manipulation, one or two nerveroots have been severed to afford the required additional room, and, at the end of the operation, sutured with fine plain catgut.

IV. The Technique of Laminectomy.—The nature of this operation has been briefly described under General Considerations. So many of the features of the operation of laminectomy are in principle common to the operation of osteoplastic resection, which has just been detailed at length, that only the

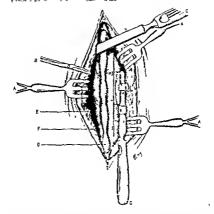


Fig. 10—Lammectons: A A \ Restractors withdrawn, edges if word \ \Prices \ \text{Aum} \) got of \ \ \text{Charge} \ \text{controlling harmorising C choiced against power power as a lutter line-range for part away from lamine, \ \Delta \text{pure of vertebry E has na \ \text{F interlaminous ligament G} \ \text{Doven away completing sections of lamine is \(\text{i} \) interlaminous ligament \(\text{G} \) \text{Doven away completing sections \(\text{laminous ligaments} \) \(\text{Constantions light ligh

		ž-e	

salient and distinguishing points of laminectomy will be here mentioned

- (1) Incision—A median meision is made directly over the centres of the apices which are, together with their corresponding laminae, to be removed. In order to give greater room for the exposure of these spines and laminae, the incision should begin over the spine next above and end over the spine next below those to be removed. (Fig. 4, C). It is a bad practice to place the vertical incision immediately to one side of the spines, in a line along which the muscles and aponeuroses are to be subsequently separated from the bone in the subperosteal operation (or incised in the open, or non subperiosteal method), for if this be done, the median lip of this wound will have to be retracted to and beyond the line of the apices of the spines when the soft parts are freed from the side of the spine opposite to the one first attacked.
- (2) Division of Muscles and Aponeuroses—These structures are divided in the same general way, in so far as the direction of incising their structures is concerned, as de scribed under Osteoplastic Resection, paragraph 2, and as indicated in Fig. 1, A and B. But as soon as the spines are reached, the kinfe should be wielded firmly and made to cut its way through the periosteum to the bone, in a straight median line over their posterior aspects, from the apex of each up to a point where the apex of the spine above prevents further incision of the periosteum. The subperiosteal method should always be undertaken unless specially contraindicated, but if it be elected not to attempt the subperiosteal operation, the kinfe should hug the spines so closely, in deepening the micision through the soft parts, that a minimum of miscle and aponeurous tissue be left adherent to the bones.
- (3) Subperiosteal freeing of Spines and Laininæ preparatory to their Division—Having started up the edge of the incised periosteum from the apiecs and posterior aspects of the spines by means of a raspatory or periosteal elevator, this process of separation may be continued or better, a clistel, with its non-bevelled edge towards the parts to be removed.

and its blade braced against the spinous processes (articular processes in the neck) as fulcra, is made to clear the soft parts from the spines and laminæ. The edge of the chisel is carefully inserted beneath the freed margin of the periosteum, and is made to remove the periosteum first from the spines and then from the laminæ, in the form of intact a layer as possible, and as adherent as possible to the overlying soft parts. As it is impracticable, in advance of clearing each spine and its set of laminæ, to incise through the periosteum along the upper and lower borders of the spine and laminæ, the layer of periosteum on each side, corresponding with each spine and the lamina of that side, must be more or less shredded and imperfect, especially where it merges into ligamentous tissue; but an attempt, nevertheless, should be made to preserve, even if in strips, enough periosteum from each spine and lamina to make the deposition of bone therefrom fairly likely. As mentioned under General Considerations, practically the only practical justification for performing laminectomy, ordinarily recognized by the writer, is the doing of the operation subperiosteally. (If the subperiosteal method be not elected, the freeing of spines and laminæ is done in the same general way as in osteoplastic resection, except, in the present instance, that the chisel, with bevel towards the spines, is braced against the spinous processes as fulcra, and the soft parts are pried away from the spines and laminæ towards the transverse processes (or articular processes in the neck). The method of manipulating the chisel is shown at C, Fig. 10, but the special feature of removing the periosteum together with the soft parts is not shown in this illustration. As a result of the procedures just described, a path is cleared for the saw, extending onto the lamina next above and the one just below those to be removed.

(4) Division of Laminæ and Ligamenta Subflava.—Having removed the packing from the wound upon one side of the spines, its lip farther from the spinous processes is firmly retracted by two special retractors, thus exposing bared laminæ (Fig. 10, A, A). The saw, held with its edge at a right angle to the surface of the laminæ and somewhat nearer

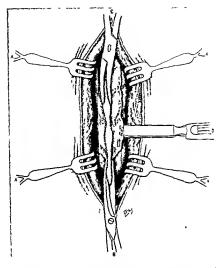


Fig. 1:—Lammestone: A. A. A. Retract to separat 1;—deep of word 2. Four of several surface of the process child or gain temp mass a direct lam use 1. Earnest 15. C. In scholl in protryes grapping pipines a dissipational signments to a limitime, out the exceed area of bone. D. A. child area of the trusteer processes and factor in the effect 1 sizes from p. out the exceed part. (Drawn from coddare c operation). Note—The inter um n. u.3 gan ent at the upper part of the wound should laplobe exprese tell out.

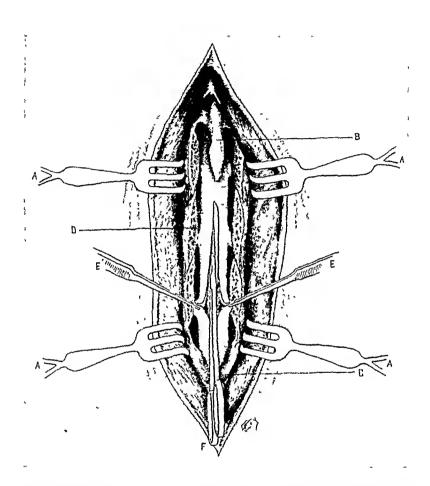


FIG. 12.—Laminectomy. A, A, A, A, Retractors holding apart margins of the wound, B, spinous process of vertebra above segment of spinal column removed; C, shelving laminæ of intact vertebra below; D, cut surface of laminæ; E, E, delicate forceps grasping membranes so as to form a transverse ridge; F, scissors in act of incising transverse ridge and continuation of membranes (Drawn from cadaveric operation.)

the bases of the transverse processes (bases of the cervical articular processes) than the bases of the spines, is made to cut through the indicated laminae, as well as through one half of the lamina next above and next below those to be removed (Fig 10, G). The course of the saw and the completion of the section should be determined as in the osteoplastic resection.

- (5) Division of Supraspinous, Interspinous, and Interlaminous Ligaments —The above ligaments between the spines and laminæ at the lower end of the section are divided with curved scissors, just as described in Osteoplastic Resection, and as illustrated in Fig. 11, B. In addition, the same ligaments are divided in the same manner at the upper end of the section. The segment of spines, laminæ, and ligaments is thus entirely isolated by the saw cuts on either side and the division of the ligaments above and below. In Fig. 11 the saw cuts and the division below are alone shown.
- (6) Separation and Removal of Ligamento-osseous Section—Having well retracted the margins of the wound (Fig 11, A, A, A, A), and determined that the sections through bone and ligaments are complete, the segment thus limited is ready to be pried from its bed. While the spines and connecting ligaments are grasped by bone holding forceps (Fig 11, C), a chisel, with its bevelled edge away from the parts to be removed, and its blade braced against the transverse processes (or cervical articular processes) as fulcra, is made by depressing its handle, to lever out the mass from its bed, aided by moderate traction upon the forceps grasping the spines. In the act of its removal, the mass is given a downward direction, so as to dislodge the uppermost lamine of the section from the lamine and spinous process of the last intact vertebra above (Fig 12, B)
- (7) Freeing of the Cord from Extradural Areolar Tissue, and Control of Intraspinal Hæmorrhage—These are accomplished exactly as in the Osteoplastic Operation described above, and partially illustrated in Fig. 8, G. (8) Opening of the Membrane of the Cord—This por-
- (8) Opening of the Membrane of the Cord —This portion of the present operation is also accomplished in a manner

similar to that mentioned under the Osteoplastic Resection, and is pictured in Fig. 12, E, E, and F.

- (9) Manner of Dealing with the Incised Membranes.—As in the Osteoplastic Operation.
- More care is here necessary than even in the osteoplastic resection. A large mass of tissue has been permanently removed, and the soft parts which were formerly in contact with the bones and ligaments which have just been removed are now to be brought into contact with each other and sutured together by deeply buried stout twenty-day chromic gut. In the apposition of these soft parts, whatever periosteum has been saved should be so manipulated as to be made to lie in as normal a relation as possible, so that whatever bony deposit occurs should take place as nearly as may be in the site of the missing laminæ and spines, and thus strengthen the spinal column. Interrupted sutures probably accomplish this object better than a continuous form of suturing.
- (11) Skin and Fascial Suturing.—A median continuous, or interrupted, suture of silkworm gut, or silk, should be placed through skin and fascia.
- (12) Provision for Drainage, when indicated.—What applies in principle in osteoplastic resection also applies here. When temporary intraspinal drainage, whether intra- or extradural, is indicated, drains are readily conducted from within outward to the skin surface, through openings left in the soft parts between omitted sutures.
- (13) After-treatment.—Here, much more than in Osteoplastic Resection, may it be indicated not only to include some form of splint in the dressing immediately following the operation, but also the wearing of some form of spinal support for several weeks or months following the operation, until the spinal column has solidified through the deposit of bone by the periosteum, or otherwise.
- (14) Comment.—The observations made under the Osteoplastic Operation also apply here.

A CASE OF CERVICAL RIB WITH SYMPTOMS RESEMBLING SUBCLAVIAN ANEURISM'

ву Јони в микрну, м D,

OF CHICAGO

THE existence of "surgical cervical rib" has been recognized by anatomists since Hunauld, in 1742, published his observation on this anomaly. True or complete cervical rib as described by Turuis (Mem de l'Academie Royale des Sciences de Paris, 1742) has no surgical significance. The surgical literature, however, has not been very profuse on the topic, and the number of cases accurately described is comparatively small. A good review of the literature is given by Dr. Daniel M. Eisendrath (American Medicine, August 20, 1904), in which he abstracts practically all of the published cases (thirty four).

The development of a cervical rib is either from the ossific centre of the transverse process of the sixth or seventh cervical vertebræ, or from a separate centre of ossification articulating with the body and transverse processes of the cervical vertebrae in the same manner as the thoracic ribs. In the cases requiring surgical attention, it apparently develops from an individual ossific centre, as do the remainder of the ribs. Indging from the statistics of cases, cervical rib does not appear to develop until the patient is well into adult life, as in twenty nine cases the average age was twenty seven years. In eight other cases (age not given) it is mentioned that they were adults elongation and growth, therefore, of the transverse process or true rib would appear to correspond somewhat with the devel Why the cervical opment or exfoliation of the wisdom teeth process or rib should increase at this period of life is not known While the transverse vertebral process has a separate centre of ossification, the process normally does not exceed

Read before the Chicago Surgical Society November 1904

five-eighths of an inch in length. In the development of a cervical rib from this process or from an independent centre of ossification, the rib not only increases in length but also in diameter as the distance from the spine increases, but the portion attached to the body of the vertebra remains the same diameter as the normal process (Fig. 1, A). Whether the growth is an addition to the tip from the cartilage that has been found capping it in many of the specimens, or whether it is an outward elongation from the vertebral body end, has not been definitely determined. It appears to me, however, on account of the increasing diameter of the rib, that the growth is by the deposit of additional bony material on the tip, in a manner similar to the growth of other long bones. In a number of cases, however, the attachment of scalenus medius or anticus to the rib is so far from the vertebra, that it would look as though the bone had elongated from its base and had been there from birth.

The length and size are well illustrated by the skiagram of Dr. Carl Beck's case. In my specimen the base of the rib measured three-eighths of an inch, while at the tip, where it curved downward to become attached to the first rib, it measured seven-eighths of an inch, and was flattened from above downward (Fig. 1, B). Cervical ribs exist normally in crocodiles (Eisendrath). In some cases the new-formed rib develops beneath and behind the branches of the brachial plexus and carries the nerve-trunks forward with the subclavian artery above it, so that the pulsation of the latter is the first conspicuous sign of trouble. Again, the end of the rib pressing on the nerves or artery and compressing them against the lower portion of the scalenus anticus (not against the margin of the first rib) causes in the former case severe pain and occasionally paralysis of the brachial plexus or one of its trunks, and in the latter an endarteritis or thrombosis, with suppression of the circulation and gangrene, or weakness of the vessel wall and aneurism (Fig. 4).

In looking over the clinical records of these cases, I was struck by the absence of cedema as a symptom, showing the

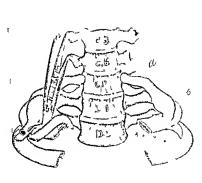


Fig 1 -Cers cal r b



Fig 2 —Case of Dr Murphy

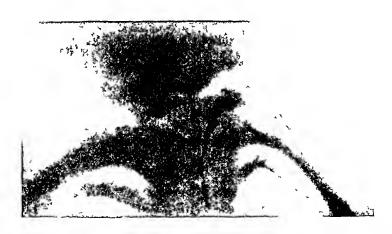


Fig 3—Case of Dr. Beck Skiagrams of cervical ribs.

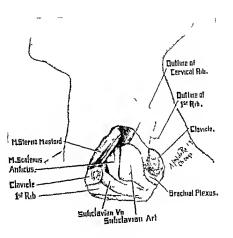


Fig 4-Cerv ca b

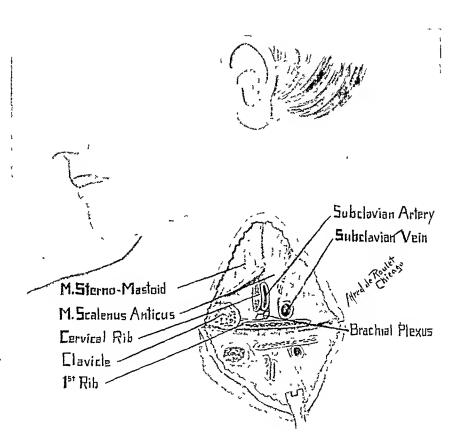


Fig 5 - Cervical rib

subclavian vein was not compressed, while the artery and nerves were severely compromised. This, I think, can be explained by the fact that the scalenus anticus is attached to the first rib and lies between the artery and vein, so the latter, situated in front of the muscle, has nothing to hold it firm for counterpressure. As the cervical rib advances forward, it carries the nerves and artery against the uniyielding muscle and severely compresses them, while the vein, being anterior and external to the muscle, is never compressed (Fig. 5).

The small number of pulsating tumors recorded would indicate that aneurism was not common, and even those classed as such are doubtful in my mind. In our case the vessel spread out so as to cover almost the entire inch of rib surface, very much resembling an aneurism, but dissection showed there was very little dilatation of the vessel at that point.

The scalenus anticus is occasionally attached to the cer vical rib, which seems to indicate its embryonal origin, but this may be only the lower attachment of the scalenus medius carried forward as the rib developed in an anterior direction. This would also tend to bind the artery and nerves beyond the possibility of escape from pressure and ultimate destruction if the rib continued to grow

Gruber's classification is a good one

- A The process like projection scarcely extending beyond the transverse process
- B The moderate degree extending an inch beyond the process with a free end or one attached to the first rib.
- C A thin quarter rib extending to the external border of the scalenus anticus with a free or attached end
- D A complete rib with a sternocostal cartilage either individual or combined with the first rib

The supernumerary rib exists on both sides in 67 per cent, or on one side in 33 per cent of the cases in which they are found

SYMPTOMATOLOGY.

The symptoms of cervical rib are entirely those of pressure and displacement involving the structures as follows:

- A. Pressure on the nerve-trunks of the brachial plexus. (Paræsthesia, paralysis.)
- B. Pressure on the subclavian artery. (Brachial ischæmia, aneurism, thrombosis, gangrene.)
- C. Tumor formation in the supraclavicular triangle.

The symptoms produced by pressure on the nerve-trunks vary from slight tingling in the forearm and hand to complete paralysis in the area supplied by the compressed nerves. the early manifestations, the symptoms are increased and diminished by changing the position of the arm. of the arm and shoulder relieves the nerve pressure, and the patients find that they rest more comfortably at night with the arm above the head, and that the boring neuralgic pains, as well as the numbness of fingers, hand, and forearm, are relieved by elevating the shoulder or supporting the body on the elbows. As the pressure becomes more severe and continued the paræsthesia and paresis are followed by anæsthesia and paralysis. The numbness and tingling announce the existence of pressure for months and even years before paralysis develops. muscles of the forearm fatigue on very slight exertion; this may be due to the cellular ischæmia or nerve exhaustion. These cases are most frequently diagnosed as brachial neuralgia, neuritis, etc.

The change in the circulation is peculiar and striking and involves the arterial, never the venous, current. If the patient presses his hands firmly together there will be a rapid return of circulation to the "life-glow" on the normal side; while on the diseased side the hand remains blanched, wrinkled, and cold from a minute to a minute and a half, resembling the anteperiodic pallor of impending Raynaud's disease. This was one of the most striking symptoms in our case. Cold water felt many degrees colder on the affected than on the healthy side. There was no evidence of venous stasis. If

there had been, the "pallor" symptom would have been absent Where the pressure had been great and continuous, the records of cases show that an obliterating endarteritis took place, and in two cases it was followed by gangrene. One can scarcely comprehend that a slow obliterating endarteritis from compression would produce a gangrene, as collateral circulation so rapidly develops, but a sudden and severe trauma of the artery in its exposed position for pressure might produce thrombosis with distant necrosis.

The sudden trauma of the artery could weaken its walls so that an aneurism would be produced, and this has undoubt edly occurred But the diagnosis of aneurism should not be accepted in these cases except where a dissection and exposure of the artery have been made. Our case, on first sight, and indeed, without the most careful examination, would have been diagnosed as aneurism, and one could scarcely convince himself that aneurism was not present on account of the broad pulsa tion as well as the lateral expansion signs. The broad surface was due, however, to the flattened condition of the subclavian artery over the wide terminus of the rib This also permitted the lateral expansion with cardiac contraction. The bruit was present and extended in a downward direction, more marked with the shoulder depressed With depression there is frequently an absent or diminished radial pulsation, when the shoulder is elevated the pulsation again becomes normal. In a number of the recorded cases radial and brachial pulsation were absent, and did not return after the relief of the pressure by removal of the rib

The ven is not caught by the advanced end of the rib, as it is situated entirely anterior to the middle scaleium muscle, and therefore admits of great displacement in a forward direction without angulation or compression. There was no exdema of the arm or forearm in our case, nor did I find it mentioned as a symptom in any of the histories even where aneurism is recorded. This, as stated above, is probably due to the relation which the vein and the artery bear to the scaleius muscle. Even an aneurismal dilatation of the artery at that point would not press on the subclavian vein but against

the anterior scalenus muscle, and, until that muscle had been destroyed by the aneurism, it could not compress the vein. Even then the vein would have ample opportunity to escape, as there would be no resisting body anterior to its inner side to act as a counter support. The relation of the scalenus muscle to the artery, nerve, and rib, and its effect as a counteracting force, has not up to this time been appreciated.

The following is a case of special interest because of the extreme severity of the symptoms before operation, and their prompt subsidence after the removal of the rib.

Patient, Mr. J. G., was admitted to Mercy Hospital, November 4, 1904. He was thirty-eight years of age and a farmer by occupation.

Present Illness.-About one and one-half years ago the patient first noticed a tingling sensation in the last phalanx of the left index-finger. This tingling and numbness were noticed especially when the hand was exposed to cold, and would disappear entirely if kept warm. The index-finger was the only part affected for six months after the onset, when the same trouble developed in the distal phalanx of the little finger. Symptoms continued about the same throughout the winter, and gradually subsided as the weather became warmer. During the summer the numbness and tingling were entirely absent, and did not reappear until two months ago, since which time all the fingers of the left hand have been affected. In addition to the disturbances of sensation, the patient now suffers severe pain in the palmar surface of the thumb and the anterior aspect of the wrist on the radial side. During the past few weeks this sharp lancinating pain has been so intense that he has been unable to sleep at night, and even large doses of morphine have failed to give relief. The left forearm and hand are always cold, and the muscular power is much weaker than before the onset of the trouble. At times the pain has radiated up the forearm to the elbow. When exposed to the cold, the forearm and hand become pale and the ends of the fingers ischæmic. To the left hand everything feels much colder than to the right. He has lost some flesh during the past few months, but the general health has been good. The patient has been treated for rheumatism and neuralgia without result.

Previous and Family History-Negative Examination-Medium stature, well nourished, lungs negative, heart nega tive One inch above the junction of the inner and middle thirds of the left clavicle a pulsating prominence is seen Palpation of this prominence shows the pulsation is expansile, but greater in the horizontal direction than in the vertical By deep pressure the pulsation of the tumor disappears, and the examining fingers then come in contact with a hard, unvielding mass, which can be traced backward to the lateral process of the seventh cervical vertebra. The pulsating tumor stands half an inch above the surrounding surface and cannot be compressed to the level of the clavicle, which might be done were it an aneurism pure and simple The brachial and radial pulsations are normal with the arm extended, but with the shoulder depressed there is a pronounced diminution in the arterial tension and force of the pulsation There is a deep pallor of the hand and forearm very pronounced after pressure on the band. There is also a peculiar coldness of the forearm and hand

Operation, November 9, 1904 -The shoulders were elevated on a small sand bag, and the chin turned to the extreme right An incision three inches long was made at the posterior border of the scalenus anticus muscle, almost parallel to it, but slanting a little backward. The subclavian artery was exposed and dis placed forward, bringing the anterior end of the cervical rib into view. The rib was freed from its attachments back to the spine and divided. The brachial plexus was then displaced inward rib slowly elevated, and the tissues gradually displaced until the anterior attachment to the first dorsal rib was in view detached with the bone forceps, and the surface of the first rib smoothed off with a chisel. The artery was then carefully exam med and seemed somewhat enlarged at the point of greatest pressure from the rib The muscles were all replaced and fixed in position by categor sutures Primary wound healing occurred and the patient was discharged from the hospital, November 14 The pain had almost entirely subsided and the circulation was much improved

Examination of patient, December 22 1904, showed that the vessel had contracted to about its usual size, and the former elevated area had sunk to the normal level. Circulatory disturbances

in the hand and forearm had subsided, the pain disappeared, and the strength of the muscles was rapidly returning.

The greatest difficulty is in the diagnosis of the condition in its early manifestations; once it is suspected, it can usually be verified by palpation and a skiagram. The latter, however, in some cases is not so satisfactory as one would wish. All cases should be operated as soon as diagnosed.

The removal of the rib is not difficult or dangerous, if care be exercised in displacing the artery and nerves. The periosteum should be removed with the rib, otherwise it might be reproduced. I know of no reported case of reformation of the rib after removal.

CASES OF INTUSSUSCEPTION IN CHILDREN TREATED BY LAPAROTOMY:

BY CHARLES HERBERT FAGGE.

OF LONDON

Sen or Surgeon to the Evel na Hospital for S ck Ch ldren

THE eighteen cases of intussusception in children on which this paper is founded are all which have come under my care at either the Evelina Hospital for Sick Children (thir teen) or at Guy's Hospital (five)

I have not operated on any case as one of intussusception which has not proved to be intussusception, nor have I met with a case in which an intussusception has been overlooked

So many writers of repute have for the past seven years urged the advantage of laparotomy over other methods of reduction, that its advisability must now be agreed upon, but well recognized lines of treatment, especially if simple and non operative, die hard, and so inflation will only be finally given up after many more successful laparotomies have been recorded.

Ethology—Of the cases under one year fourteen in all ten were stated to have been entirely breast fed and all the babies were decidedly above the average of hospital patients in size and degree of nourishment

Presence of a Tumor—In sixteen of the eighteen cases a tumor was felt either through the abdominal wall or per rectum, and several times the value of binanual examination as suggested by Mr Eve (Clinical Journal, 1899) was demonstrated, in fifteen of these sixteen cases diagnosis was easy and treatment was prompt. In one case (No. 16), on the history of some weeks' abdominal prin with occasional attacks of vomiting, a diagnosis of tuberculous peritoritis was made, the tumor being regarded as matted omentum and in

¹ Read before the Clinical Society of London December 9 1904

testines, and in consequence of this, operative interference was undertaken too late; this was probably a chronic intussusception, in which the acute exacerbations were caused by an increase of the invagination.

Both the cases in which no tumor was found ended fatally; in one (No. 4) the symptoms were not typical, and operation was delayed for twenty-four hours after her admission. Her symptoms before death were most peculiar, and were suggestive of some cerebral lesion rather than of any result of the intussusception; unfortunately, no post-mortem could be obtained. In the other case (No. 11), the abdominal distention and the position of the intussusception, which was enteric, no doubt were responsible for the failure to detect a tumor.

Yet, while a tumor was so frequently present, my cases well emphasize the variability of its position and the value of an examination under an anæsthetic in locating it. In fact, the observance of routine examination under an anæsthetic has several times led to the detection of a tumor in a case which might otherwise have been regarded as one of enteritis; unfortunately, in Case No. 4 this precaution was neglected.

Duration before Operation.—All writers agree that there

Duration before Operation.—All writers agree that there is no exact relation between duration and ease of reducibility; but of those in which the time is given, all of less than forty-eight hours' duration were reducible, though with varying ease, which strikingly bears out Gibson's (Annals of Surgery, 1900) contention that after the second day the ease of reducibility markedly diminishes; for he reckons that on the first day 94 per cent., on the second day 83 per cent., and on the third day 61 per cent., are reducible.

Variety of Intussusception.—After Mr. Corner's exhaustive paper (Annals of Surgery, 1903), and as Mr. Wallace has fully dealt with this part of the subject in his paper, I do not propose to say much about the varieties of intussusception met with. It seems now probable that single ileocæcal intussusceptions are not as common as earlier writers—Sargent (St. Thomas's Hospital Reports, 1900) and Eccles

(St Bartholomew's Hospital Reports)—considered, yet, though I have since my first operation carefully looked for double intussusceptions, ten, at least, of my eighteen cases were of the single ileocascal type. The eleventh single intus susception was enteric (No II), and was of interest in that the ileum at the apex of the intussusception was so much narrowed as to suggest the possibility of a congenital stricture at that spot having given rise to the intussusception. A second point worth mention in this case was a persistent Meckel's diverticulum. This was some distance above the intussusception and clearly had never been involved.

I can only record seven double intussusceptions colinicocacal, 3, ileocolic colic, 2, enteric-ileocacal, 2

My early acquaintance in April, 1900 (Case No 2), with the execal variety of Mr Eve (Clinical Journal, 1899), de scribed by Mr Corner as colic ileocæcal, led me to look for this form again, but only two other examples (Nos 14 and 17) were met with, making 166 per cent of the eighteen cases

In Case No 7 there was possibly a triple intussusception, for the ileum was prolapsed into or through the ileocæcal valve, and there was a well marked and apparently independent invagination of the caput coli some distance to the right of the valve, so that this may be colic ileocolic colic, and not ileocolic-colic, as I have regarded it in my list

I do not attach great value to a minute division of in tussisceptions into many varieties, and at an operation completed as rapidly as possible it is obviously most difficult to distinguish between forms so nearly related as ileocolic-colic and enteric-ileocæcal (Corner)

Treatment and Technique—In seventeen of my cases primary laparotomy was undertaken at the earliest possible moment, in the eighteenth (No 9), inflation had been twice tried and had failed before I saw the case Except in cases 11 and 16 my incision was always made on the right side of the middle line, with the centre at or below the level of the umbilicus, in the majority it was through the right semilianar line, but recently I have cut vertically over the right

rectus, separating its fibres, thinking that by this means a firmer scar might be obtained.

I have not made use of the combined method of inflation with laparotomy (Kellock), which in my opinion, besides the time necessary for its performance, has the great disadvantage that it increases the intra-abdominal contents, and therefore will militate against the replacement of the already distended intestines within the abdomen. I have found that a second assistant's finger introduced per rectum promptly and gently reduces the intussusception usually as high as the iliac colon, where it can be easily dealt with by the operator from the abdominal cavity.

Until the reduction has reached the ascending colon it is carried out partly out of sight; then the intussusception is delivered from the abdomen, and the remainder of the procedure carefully watched.

Escape of the intestines during the manipulation of the intussusception is, I feel sure, to be avoided whenever possible, and, in fact, often the chief difficulty is experienced and much loss of time is occasioned in returning the escaped bowel within the peritoneal cavity; further, I feel sure that the dragging of the dependent intestines upon the mesenteric plexuses increases shock. When this does happen and the bowel is much distended, I have found it most useful for the assistant to strongly lift up and separate the two edges of the wound with Spencer Wells's forceps, when the bowel can be paid back coil by coil into the abdomen.

Unless the condition of the patient was extreme, the abdominal wall was always united by three layers of sutures, silk in the early cases and catgut recently being used for the buried sutures.

Results.—Six cases (Nos. 3, 10, 11, 15, 16, and 18) died between four and twenty hours after the operation from shock and toxemia; of these in Nos. 11, 15, 16, and 18 this was clearly due to the resection of the bowel. One (No. 10) was so ill that nothing more than the formation of an artificial anus could be attempted.

As there was no post-mortem in Case 4, I cannot suggest the cause of death on the fourth day, when the abdomen was opened a second time, it was thought that the intestines might not have recovered from the strangulation, but everything was found to be perfectly healthy, and there was no obvious cause for her condition

I do not propose with my small number of cases to dwell on statistics, my immediate results show a mortality of 39 per cent (seven deaths in eighteen cases), if we include two other babies (Cases 5 and 6) who were readmitted within a few days of their discharge, and whose death was indirectly a result of the intussusception, the mortality increases to 50 per cent, both these died twenty three days after the lapa rotomy, which could have had no relation to the ultimate result

I have perhaps been unfortunate in the large proportion of irreducible and gangrenous intussusceptions (five cases) that have come under my notice, for, excluding these, the mortality of two out of thirteen laparotomies works out at 154 per cent

I am sure everybody will agree that no mechanical means alone could reduce an intussusception found to be irreducible or gangrenous at a laparotomy, and yet I know of no statis ties embracing a large number of cases treated alone by inflation which give a mortality even as low as 50 per cent

In the two cases (Nos 5 and 6) who were rendmitted for diarrheea it is probable that the intestines, though easily reduced, did not return to their normal condition. In support of this idea, the notes of the post mortem on No 5 are most interesting, for here the reduction was peculiarly easy and the intestines at the time of operation apparently only slightly strangulated. It is therefore probable that the same result would have followed reduction by mechanical means, which suggests that intussusception may be followed by remote as well as immediate risks, and that the recovery of the child from his acute illness may be more apparent than real. It would be interesting to know whether the ultimate results in

CASES OF INTUSSUSCEPTION

		1	<u> </u>	I			1	11101
No.	Name.	Sex.	Age.	Date.	Feed- ing.	Symptoms.	Position of Tumor.	Time of Operation after Ons
1	L. C.	F.	3⅓ months	Apl., 1900	Breast	Sudden onset, crying out and vomit- ing. Blood passed ten hours after onset. Tumor felt in abdomen.	Right hypo- chondrium.	21 hours
2	c.w.	F.	3½ months	Apl., 1900	Breast	sick. Blood six hours after onset. Abdomen rigid and distended. Nil on R. E., but tumor felt bimanually	Right inguinal region, just above pelvic brim.	45 hours
3	A. E.	м.	5 months.	Dec., 1900	Breast	under anæsthetic. Sudden onset, screaming. Blood passed five hours after onset, vomiting. Tumor felt, and on R. E. apex of intussusception 1½ inches from	Left iliac region.	33½ hou
4	L.R.	F.	9 years.	Mar., 1900		anus. Vomiting, pain under right rectus; bowels open, no blood. Sent in diag- nosed as intussusception. Nothing found even under anæsthetic, very sick.	No tumor.	3 days
5	E. N.	М.	3 months.	July, 1901	Breast	Sudden onset, crying, and soon passed blood and mucus, vomited. Tumor felt. R. E. nil.	Right lumbar region.	15 hours
6	м. G.	F.	6 months.	Sept.,1901	Breast	Sudden onset, vomiting, crying, passed blood and mucus. Tumor felt. R. E. revealed nil, but blood and inucus were on finger; nothing on bimanual	Right lumbar and hypo- chondriac re- gions.	*
7	D. H.	М.	8 months.	Jan., 1902	Breast	examination. Strained and passed normal stool, when "prolapse" came down, which doctor reduced, after which blood	Projecting from anus.	30 hours
8	W. M.	м.	6 months.	June, 1902	Not stated	and mucus were passed and "pro- lapse" came down again. Blood passed, vomiting, and tumor felt.	Not stated.	••••
9	J. D.	м.	9 months.	Aug., 1902	Not stated	Sudden onset, vomiting, blood passed, tumor felt.	Umbilical region.	9
10	A. G.	м.	3 months.	Aug., 1902	Breast	Sudden collapse, vomiting, blood and slime passed, tumor felt. On R. E. no tumor felt, but blood on finger.	Left side, mainly in left liiac region.	
11	R. B.	м.	15 years.	Sept., 1902	••••	Pain in abdomen, vomiting, B. O. only once since onset (five days), and then blood was passed. Some distention.	No tumor.	5 days
12	A. D.	М.	II months.	Dec., 1902	Breast and other	Sudden onset of vomiting tumor easily felt. R. E. disclosed apex 1½ inches from anus.	Left side from left hypo- chondrium to	
13	C. R.	F.	5 months.	Feb., 1904	food Breast	Sudden onset, crying, straining, persistent vomiting, passage of blood and slime. No tumor felt until anæsthetic given, when a transverse tumor	left iliac fossa Umbilical re- gion.	32½ hot
14	E.C.M.	м.	4½ months	Mar., 1904	Not stated	was found. Crying, passed mucus and blood, tumor felt under anæsthetic.	Not stated.	5¾ hou
15	в. м.	м.	3 years.	Apl., 1904	••••	•••••	•••••	
16	E. B.	F.	9½ years.	Apl., 1904		Has been ill for six weeks with abdominal pains and vomiting, was treated at another hospital, and admitted to Evelina three weeks before operation. Mass felt around umbilicus. There was only occasional vomiting until three days before operation, after which it was frequent. Tumor unaltered. Abdominal pain almost constant. Bowels	Umbilical.	3 weed 3 days
17	C.E.U.	М.	II inonths	June, 1904	Breast	irregular. No blood passed. Sudden vomiting, much crying, with pain. Tumor felt. On R. E. nothing found.	Right hypo- chondrium and epigas- trium.	8½ hou
18	E. S.	М.	8 months.	Dec., 1904	Breast	Passage of blood. Severe abdominal pain; no vomiting. Treated three weeks for dysentery.	Not felt in ab- domen, easily felt per rec- tum.	3 weeks
							language 2: He	ocolic-

CASES, 18. Males, 12; Females, 6. { Ileocæcal, 10; Colic—ileocæcal, 3; Enteric—ileocæcal, 2; Ileocolic—colic,?2; Enteric, 1.

N CHILDREN Duration Result Remarks of Ultimate Result. Operation 35 minutes 1 layer 3 layers Not stated Died reaca1 locaecal 3 layers About . minut itence— I layer is minutes Dischargers Was not admitted until twenty four Readmitted post day with board in the board of the work of the state of th

leociecal colic— feocolic	3 layers	32 Minutes	Discharged	Reduction very e in rectum has finger within r	asy, after all the part i been reduced by a ectum	December, 1904, quite well scar firm
kocaecal :			Discharged	Report missing	Notes from observ	Readmitted in September 1902 and died of broncho pheumonia, ciecal region
kocsecal	١٠.١	1-			٠ ٠.	hormal
ireduced t P M lund to be	٠				٠.	five hours later A
koczeal hene	3 layers	45 minutes	Died	P•		
hoczcal	3 layers	35 minutes	Discharged	Residence dubes	alt and protonged	December, 1994, 18 delicate
lebe- lebesecal	3 layers	17 minuses	Discharged	Reduction easy dimple	Well marked carcal	December 1904 seems well but still passes blood Scar firm
leocrecal	3 layers	Under 30 minutes	Discharged	Reduction easy,	suture of abdominal	
Enteric— Reocretai	3 layers	About 45 minutes				
Deocolic-		Under 60 minutes	Died			

a large number of cases treated by different methods confirm this suspicion of vulnerability in children who have recently suffered from intussusception.

May I venture to suggest for discussion the treatment of irreducible intussusception?

Here I think we must separate simple irreducible cases from those which, besides being irreducible, are also gangrenous. Thinking over my five irreducible cases (Nos. 10, 11, 15, 16, and 18), I am in agreement with Gibson (Annals of Surgery, 1900) in decidedly preferring resection in gangrenous cases to the formation of an artificial anus, for, as Gibson points out, the latter does not remove the infective intestine.

In non-septic irreducible cases, either an artificial anus or a longitudinal division of the ensheathing and returning layers may be undertaken, and I intend in my next case to adopt the latter course, following it, if necessary, by a modified resection.

In the four cases with gangrenous bowel resection was carried out in three (Nos. 11, 15, and 16) by enterectomy between Lane's clamps and end-to-end union by simple suture in two layers, the inner passing through all the coats and the outer through the peritoneal and muscular coats only. In the eighteenth case the apex of the intussusception was exposed by incision through the ensheathing layer and cut off, the cut ends of the intestine being united by Maunsell's method.

Gibson (*loc. cit.*) quotes sixty-one cases of irreducible or gangrenous intussusceptions of which forty-nine died, and the fact that there was only one resection for a gangrenous intussusception among the twelve recoveries is a strong argument for inquiry as to the best line of treatment in these cases.

A SERIES OF CASES OF INTUSSUSCEPTION IN CHILDHOOD.

BY CUTHBERT WALLACE, MB, BS, FR.CS (ENG), OF LONDON,

Surgeon to St. Thomas s. Hospital. (in charge of Out Patients). Assistant Surgeon. East. London Hospital for Children.

This series is made up of twenty cases,—twelve were males and eight were females. They were treated at St. Thomas's Hospital and at the East Loudon Hospital for Children, between the years 1898 and 1904. The cases were consecutive, and include all that have passed through my hands. The results are good, I think, but they only represent the improvement that has taken place at all hospitals of late years, due to the now almost universal custom of speedy operative interference, which is largely due to the efforts of Mr. E. A. Barker.

Nature of the Intussusception—Of the twenty cases, nine teen were enterocole, that is, im olved both the large and small guts, the remaining case was of the colic variety. Of the former class ten were single and nine were double intussusceptions. The single intussusceptions were of the ordinary ileocaecal type. It is, however, possible that in two the starting point was an invagination of the outer wall of the execum, since, after the reduction of the tumor, this part of the execal wall remained invaginated, and was with difficulty made to resume its normal shape.

Of the double tumors there were four cases of the enteric ileocæcal (iliaca ileocolica) and five cases of the ileocolic-ileocæcal (ileocolic colic) varieties

These facts can be tabulated as follows

Number of cases 20 Small and large gut involved 19 Large gut involved 1

Read before the Clinical Society of London December 9 1904

(1) Ileocæcal	10,	or	50	per	cent.
(2) Ileocolic-ileocæcal (ileocolic-colic)					
(3) Enteric-ileocæcal (iliaca-ileocolica)					
(4) Colic	1,	or	5	per	cent.
					·

20, or 100 per cent.

The diagnosis of the enteric-ileocæcal was made if an enteric intussusception remained after the large gut had been entirely reduced.

An ileocolic-ileocæcal (ileocolic-colic) intussusception was diagnosed, if after the reappearance of the cæcum and the appendix there was still small intestine prolapsed through the valve.

On account of the frequent occurrence of double intussusceptions, Mr. E. M. Corner, in a very interesting paper (Annals of Surgery, May, 1903), expressed his opinion that the accepted ideas as to the comparative frequency of the different forms of intussusception must undergo a modification.

Mr. Corner has prepared a table showing what he believes to be the relative frequency of the different varieties, and has proposed a nomenclature for the double intussusceptions.

My own series certainly bear out the contention that double tumors are more frequent than has hitherto been considered to be the case. It is, however, open to doubt that a useful purpose is served by a complicated classification.

If we take the case of those intussusceptions that originate near the ileocæcal valve, we find that they are all of the ileocæcal type, and that the main characteristics of the intussusceptions are identical as regards their appearance and the structures forming their walls; and it is only after the reduction of the main tumor that the presence of a second intussusception allows a differential diagnosis to be made.

The ileocæcal region of the intestinal tract is a complicated one, and, having attracted much attention, is more richly endowed with names than any other region of the same length.

With a little ingenuity a very extensive nomenclature can be made out for intussusceptions arising in the neighborhood, and this will be still further increased by the frequent occur rence of double tumors. In the latter case the names to be assigned to the different forms will vary with the views of the individual making the classification.

For instance should an intussusception that starts as a prolapse of the small gut through the ileocecal valve be termed ileocolic colic or ileocolic ileocecal or suppose an enteric intus susception becomes impacted in the valve and then both valve and enteric intussusception become invaginated into the colon is the resulting tumor to be cilled enteric ileocecal or enteric ileocolic ileocecal or enteric ileocecal colic? Such compound names are made up on the assumption that the last intussusception to be reduced is the first to be formed but I do not know if there is any proof that this is the case

Even in the case of single tumors there are difficulties thus. What is the proper designation of an intussusception that starts in the caput coli and eventually involves the small gut? Is it cæco colic or cæco eleocæcal or colic ileocæcal? (Corner.) Again suppose the appendix is found to be in vaginated after the rest of the intussusception has been reduced how is such a tumor to be named? In fact any attempt to name all possible forms of intussusception can only lead to confusion.

I would suggest that instead of complicating the nomen clature it would be better to simplify it and call all intussus ceptions involving large and small gut entero colic and indicate whether they are double and where they started

Although the eleocecal variety is rarer than the existing tables make out my own series seems to show that it is still frequently to be met with as a single intussusception

The observations on which this paper is founded were made with the suspicion that compound tumors were fairly common and I was careful to observe the state of the bowel at the end of the reduction

In this series there occurred no example of an enteric or simple ileocolic intussusception The latter when it was met with, was only found after the main intussusception had been reduced. An ileocolic intussusception must always be of small extent, since the amount of small gut prolapsed through the ileocæcal valve must be limited by the length of the mesentery of the small gut, and it therefore stands to reason that the length of small gut involved cannot be more than double the length of the mesentery; as a matter of fact, it seems to very rarely reach even this extent.

In this variety the increase in length is made at the expense of the entering tube; in this particular, and in that the most advanced portion is not constant, it differs from other intussusceptions, and is really more of the nature of a prolapse than a genuine intussusception.

Diagnosis.—This, as a rule, is sufficiently easy, since the occurrence of the usual history and symptoms with the presence of a tumor in the abdomen or rectum renders the diagnosis practically certain. It is indeed on the presence of the tumor that we must rely to differentiate this disease from some forms of enteritis. My own experience has led me to the belief that a tumor can in by far the greater number of cases be felt without difficulty, and should there be any doubt, an anæsthetic will at once settle the question. The importance of giving an anæsthetic when in doubt, instead of waiting, has been insisted upon by Mr. F. C. Wallis (Lancet, June 11, 1904), and I should like to add my testimony to his. On the other hand, I have known a tumor confuse the diagnosis in two cases under my care. In one the tumor turned out to be a mass of glands near the cæcum, and in the other the tumor was a long dependent lobe of the liver.

Causation.—Of the sixteen cases in which a definite statement is made, there was only a history of improper feeding in three instances. In every instance the patients were well-nourished, healthy children; they were not rhachitic, nor did their appearance suggest improper feeding. Indeed, it seems probable that the success of the operative treatment may largely depend on the fact that the general good health of the

patients enables them to combat successfully the shock of abdominal section

This series, therefore, throws no light, except in a negative character, on the causation of intussusception

Duration before Operation —The extremes were seven hours and four days

With the exception of two cases in which resection was performed, and in which there was a possibility respectively of a fourteen and twenty one days' history, was there any relation between the duration of the symptoms and the difficulty of reduction, neither could I trace any relation between the nature of the intussusception and the facility or otherwise of the reduction

Treatment—This may now be stated to be primary abdominal section Inflation, except as an auxiliary measure to reduce the tumor out of the pelvis, as advised by Mr Kellock, is now abandoned If further proof of the inefficiency of inflation were needed, Case 6 would furnish it. In this case, inflation was tried three times, and on each occasion the tumor reappeared

The site of the incision is open to discussion

If the intussusception has reached the pelvis, no one in cision will be the most convenient at all stages of its reduction. The site of the abdominal opening must therefore be largely determined by the fact that it is necessary to perform the last stages of reduction with the tumor in sight. The incision adopted in this series was one through the right rectus muscle, its length was about three inches, and its centre lay three-fourths of an inch to the right and below the umbilicus.

This situation lies nearly at the centre of the circle traced by an intussusception, but is sufficiently near the normal site of the execum to permit the timor to be easily brought out at the end of reduction, if not during the whole course. I have found that it is often extremely difficult to keep the tumor in sight while the reduction is being effected at the splenic and hepitic flexion of the colon.

The following was the technique adopted in this series

Directly the peritoneum was opened, the end of the tumor was brought out of the wound and the reduction accomplished under the eye. If the tumor lay in the pelvis, it was necessary occasionally to reduce a few inches within the abdomen until the lower end came easily under the wound.

No attempt was made to retain the intestines in the abdomen. If they escaped,—and they did so in the majority of cases,—they were simply covered up with a warm sponge. In fact, the intestines were not the object of any special solicitude. The point aimed at was rapidity of operation. The average time taken in eleven cases in which a note was made was fourteen minutes; in this list are included a resection of gut and the excision of a gangrenous appendix.

Suture.—The incision through the rectus muscle facilitates rapid suture, since the layers are quite distinct in this situation.

The following were the methods adopted: Suture in one layer, 4; suture in three layers, 9; suture through all layers and separate suture of anterior rectus sheath, 6; not stated, 1. Total, 20.

The material used was, as a rule, fine silkworm gut, and in a few cases fine silk.

Of the nine cases sutured in layers, two burst open and required resuture; one of these ended fatally. The case that recovered was resutured by Mr. Llewellyn at the East London Hospital for Children. This want of union in young children is a factor that must be reckoned with, and is best avoided, I think, by using deep sutures through all the coats and separate suture of the anterior rectus sheath.

The cause of the reopening of the wound is the failure of reaction and the sloughing of the delicate tissues in the embrace of the sutures, when only thin layers are included.

I have within the last six months seen the scar in all the successful cases, and in every instance they were perfectly sound. This fact tends to show that, as regards ultimate results, the method of suture is immaterial.

Results of the Operations.—The time that elapsed between

the operation and the advent of death showed that the fatal result was not directly due to the effects of the operation

The intervals were (1) six days, (2) six days, (3) ten days, (4) few hours

The causes of death were (1) bursting open of the wound, (2) thrombosis of cerebral veins (resection case) (3) gangrene of cæcum and mantion, (4) shock, extensive resection of nearly the whole of the large gut

Mr Barker, who has had great experience of these cases lays special stress on reducing the intussusception within the abdomen in order to reduce shock. This series seems to show that after all too much stress can be laid on this point, as no attempt was made to keep the intestines in if they insisted in coming out. It seems to me that much valuable time may thus be lost. The two methods, at any rate, show equally good results.

The Appendix—One interesting point in the series was the difference in the appearance of the appendix. In five in stances this organ was normal in color, though the intestine in its immediate neighborhood was black from congestion. It did not appear that the variety of intussusception had any relation to the state of this organ.

After history —With three exceptions. I have traced all the successful cases.

In all the scars are sound no matter the method employed In all the children are healthy and well, except in one case where attacks of vomiting occurred at times. This case succumbed to acute strangulation by a band

CASE—A W B suffered from attacks of comiting at times for which he was admitted to hospital. With simple treatment the attacks subsided and as nothing abnormal was noted in the abdomen no operative measures were proposed. In June 1904 the child (then four years old) was admitted for acute intestinal obstruction. The obstruction, due to a band passing from the mesentery to the bowel wall was relieved but death ensued in forty eight hours.

It is remarkable that a child aged only sixteen weeks and extremely ill should have survived a cœliotomy for the reduction of an intussusception, while at the age of four it should have succumbed to a like operation for the relief of acute obstruction by a band. It certainly serves to show how very grave a disease is acute obstruction by a band. This fact has been emphasized by Mr. Makins, who believes that but little improvement in the mortality of this disease has taken place of late years.

The Fall in the Mortality.—In my series there were twenty cases and four deaths, which give a mortality of 20 per cent. If the cases in which a resection was performed were excluded, the mortality falls to 11.11 per cent.

Taking the cases under one year of age, there were sixteen, with three deaths; mortality, 18.75 per cent.; or, excluding the case of resection, 13.33 per cent.

From Sargent's tables (St. Thomas's Hospital Reports, 1900), I find that from 1892 to 1901 there were sixty-two cases of intussusception in children under one year, which were treated by collistomy (inflation has been tried in some). There were thirty-eight deaths, or a mortality of 61.29 per cent. If all the cases under one year are taken into account, the numbers are seventy-two cases, and the mortality 61.11 per cent.

Barker (Clinical Society's Transactions, Vol. xxxi) gives the following figures from cases that occurred in University College Hospital from 1892 to 1896 (both years included): Under one year, fifteen cases; mortality, 40 per cent.; under one year, treated by collotomy (either primary or after inflation), fourteen cases; mortality, 42.86 per cent. Of cases treated by Barker himself, there were twenty-five, with a mortality of 28 per cent.

Mr. D'Arcy Power in 1898 stated that the mortality of cases (not necessarily under one year) operated on within forty-eight hours of the onset was 22 per cent., and expresses the belief that this would be lower in the near future. The improvement that has taken place is well shown in the follow-

ing table of cases treated at St. Thomas's Hospital (Sargent) All cases under one year (no matter how treated)

	Diro	CLERD
1893	3	1
1893	2	0
1894	1	1
1895	4	1
1896	5	r
1897	6	1
1898	4	2 Cochotomy (primary) as a routine measure
1899	6	8
1900	6	6
1901	7	7
		-

Total, 74. mortality, 61 11 per cent

In the last three of the above years there were forty cases with nineteen deaths, or a mortality of 47.5 per cent

Intussusception, like appendicitis, seems to be on the in crease, at any rate as regards those admitted to hospital

The following figures are from St Thomas's

Year (Periods of five years)	Number of Cases of In tussusception	Total \umber of Admissions to St Thomas s Hospital
	tusausception	
1879-1883	10	20,016
1834-1888	10	23 103
1889-1893	12	23,338
1894-1898	40	29 493
1800-1003	90	31 547

From this it will be seen that the number of intussusceptions has increased tenfold, while the total admissions, all departments included, have only increased by one-half. The increase is therefore actual and relative

In conclusion, and as showing well the strides that have been made in treatment, I cannot do better than quote one or two passages from a book* written by a great authority on this subject in 1884

^{*}Some points in the Analomy Pathology and Surgery of Intussus ception

TABLE OF TWENTY CASES OF

No.	Name.	Sex.	Age.	Duration of Operation.	Situation of Tumor.	Method of Feeding.	Nature of Intussusception.	Method of Suture.	
1	A.W.B.	м.	16 wceks.	7 hours.	Left iliac fossa.	Not stated.	Ileocæcal.	ı layer.	
2	A.S.	м.	5 inontlis.	10 hours.	Umbilical.	"No improper food."	Enteric— ilcocæcal.	Not stated.	
3	F. W.	м.	20 weeks.	2 days.	Present;	Not stated.	Ileocæcal.	3 layers.	
4	F. C.	F.	33 months.	6 days. ? 3 weeks.	not stated. Left iliac fossa, also protruded from anus.	Nothing wrong noted.	Ileocæcal.	ı layer.	
5	J. B.	M.	17 months.	3 days.	Left loin, also felt in rectum.	Breast, also bread and butter.	Ileocæcal.	Deep and rec- tus sheath sutures.	
6	L. L.	F.	7 months.	30 hours.	Left iliac fossa.	Breast, occa- sional bread and butter.	Enteric— ileocæcal.	Deep and ant rectus sheath sutures.	
7	H.R.	М.	8 months.	4 days.	Right hypo- chondrium.	Breast.	lleocæcal.	3 layers with 1 deep sutur	
8	А. Н.	F.	3 months.	36 hours.	Left lumbar, felt in rec-	Breast.	Ileocæcal.	3 layers with 2 deep suture	
9	C. A.	F.	6 months.	2 days.	Left loin, felt in rectum.	Breast and bottle.	Heocæcal.	Deep and ant rectus sheath sutures.	
10	J. R.	M.	5 months.	26 hours.	Splenic	Breast.	Enteric— ileocæcal.	3 layers and 1 deep sutur	
11	S. B.	M.	5 months.	18 hours.	region. Umbilical region.	Breast; had a piece of mackerel.	Ileocolic— ileocæcal.	3 layers.	
12	E. A.	F.	5 months.	18 hours.	Umbilical region.	Breast.	Ileocolic— ilcocæcal.	3 layers.	
13	P. S.	F,	21 months.	2 days.	Splenic	Not stated.	Colic.	3 layers.	
14	W. F.	M.	4 months.	12 hours.	region. Splenic region.	Breast.	Ileocolic— ileocæcal.	3 layers	
15	S. P.	F.	3 months.	28 hours.	Splenic region.	Breast.	Enteric— ileocæcal.	Deep and ant rectus sheath	
16	R. W.	M.	8 months.	8 hours.	Left loin.	Breast.	Ileocæcal.	Deep and ant rectus sheatl	
17	M.R.F.	F.	2 years.	2 days.	Left loin.	Nothing ab- normal,	Heocæcal.	sutures. 3 layers.	
18	A.W.P.	M.	5 months.	14 days or 30 hours.	Left loin.	Breast, some bread.	Ileocolic— ileocæcal.	Deep sutures.	
19	R.S.	M.	6 months.	25 hours.	Umbilical region.	Not stated.	Ilcocolic— ileocæcal.	Ant. slieath and deep sutures.	
20	L.C.W.	M.	9 months.	1 week.	Left loin.	Breast till eight months, then little bread and butter.	Ileocæcal.	Deep.	

INTUSSUSCEPTION IN CHILDREN

Remarks

Child apparently morehand before 1838

Year

Ult mate H story

Diration of Reduction Result

minutes	Easy		first operation	May	January 1904 Scar sound Has attacks of vomiting cause not to be made out Died of acute strangu lation by a band June 1904.
n m nutes	Final part of ileo- execal d ffeult	c	Reduction by inflat on had failed Small enteric tumor remained after main reduction	1899 May	Well at end of sia months Janu ary 1904 not traced
7 minutes		D	Wound found burst open on fourth day Resutured	Jan	Post mortem Carcum still infit trated with blood Died on sixth day
no m nutes	Impossible	D	Reduced to hepatic flexure when outer cont was found to have sloughed in a buear manner for the extent of three-quarters of circumference of gut Encision Artificial anna Food takea well Bowells acted	r899 April	Daed on tenth day Post mortem Thrombosis of cerebral veins No peritonitis
o minutes	Easy	С	Pulse 160 on admission, abdominal facies Tumor palpable only un der anæsthelie	July	Well in October 1903
	Difficulty at crecum	С	Inflated three times but recurred Enteric tumor measured two and a half inches Appendix normal in color ibough execum was black	July July	Not traced
13 pp. Digtes	Difficult near cæcum	С	Appendix quite normal in color Inflation had failed	Nov	Well in October 1903
15 minutes	Difficult	С	Tumor only felt under an esthetic	Dec Dec	Quite well Scar sound February,
Not stated	Easy	С	though cocum was black Tumor could be felt in rectum	Aptil	January 1904 Quite well Scar sound
9 m nutes	D filenit at	С	Appendix only slightly congested	1902 Nov	January 1904 Quite well Scar
a7 minutes	Very d moult indeed	D	Appendia normal at base but along ting at apex eacesed Four inches of iteum through valve Last two inches of iteum had a thick patch of infiltration on wall opposite meantiry suggestive of a tumor incision showed only blood in tissues	April	council of marasmus Fost moriem Crecum and several soches of sleum color black and almost gangrenous Death oa strib day
20 minutes	Ileocolic difficult	С	lleum through valve for space of	1903 May	January 1904 Quite well Sear
Not stated	Eas)	c	Dimple in the transverse colon at starting point of tumor	Aug 1903	January 1904 Qutte well Cear sound
Not stated	Easy	c	Wound found burst open re- autured Sa to eight inches of small gut through the valve last two inches deeply congested	1903 Sept	Well some months after operat on 1904
Not stated	Easy	С	Small enteric separated by a distinct interval from the valve	1903 May	Well some months after operation 1904
Not stated	D fficult at	c	Czecum dimpled apparently this was the starting point	NOA 1003	January 1904 Quite well Scar
Not stated	D fiicult	С	Large d mple on creeum that would not be everted Appendix normal in color	1903 Feb	Not traced
	Extremely difficult	С	normal in color	Feb	Cacum burst open in attempt to reduce eleocolic port on liner middle layers extruded and re- duced like a paraphimosis Cacum sutured
15 minutes		С	Appendix normal in color	1904 March	Caccansarated
20 Ininutes	Impossible	а	Gut ruptured just below splenic flexure Not gaugrenous but extremely inable Resection Artificial anus	April	Death in a tew hours

"The administration of opium is absolutely essential in these cases; there are substantial reasons for believing that under the influence of opium, administered early, an invagination may undergo cure by spontaneous reduction. Perceiving, as is probable, that no marked improvement follows, the next measure is in an attempt to reduce the invagination by means of enemata or insufflation. These modes of treatment have met with very encouraging success, and are worthy of a patient trial. Should these measures fail, there are substantial reasons for recommending an immediate laparotomy, especially in the young."

In twenty years, then, cœliotomy has risen from a last resource to a primary measure.

INTERSTITIAL HERMIAL

BY CHARLES GREENE CUMSTON, M D,

Interstitial hernia was described, probably for the first time, by Bartholini in 1661, although, from his writings, it is evident that his account is more or less ambiguous, and it was not until 1797 that the famous surgeon Jean Petit gave a more positive description of the affection. In the first quarter of the last century several varieties of interstitial hernia were described by Boyer, Hesselback Astley Cooper, and Goyrand while more recently Kronlein and Kuster have occupied them selves with the question. The term of hernia interparietalis is due to Malgaigne, but he only goes so far as to say that the hernia is placed between the layers of the abdominal pariets Finally, these hernia were divided into three classes, as follows

- (1) Propertioneal inguinal hernia situated between the parietal peritoneum and the fascia of the transversalis,
- (2) Interstitual inguinal hernia, seated in the layers of the abdominal wall.
- (3) Superficial inguinal hernia found between the super ficial fascia and the external oblique muscle

The second type here mentioned can be divided into four subvarieties, according to the four possible locations of the herma to which special names have been given by Gobell He however, does not believe this nomenclature advisable because of the confusion it might create

There is no doubt whatsoever in my mind that the so-called hermal interparietalis is a true herma, because it is possessed of a hermal sac formed by the peritoneum a ring, and a contents. The ring is composed of Poupart's ligiment below,

^aRead by title at the meeting of the American Association of Obstetricians and Gyngeologists St Louis September 13-16 1904

above by the free border of the internal oblique and transversalis, and inwardly by the rectus. In my own case the borders of the ring were smooth and tendinous in structure and was positively recognized as the internal inguinal ring. The sac simply contained a loop of small intestine, but in other cases reported the contents were composed of small intestine, the colon, omentum, cæcum, while in others the testicle, covered only by its tunica albuginea, was found deep down in the opening. The testicle has also been found free from the sac in a case recorded by Schindler and Steudner in which a gangrenous cæcum formed the contents of the hernia.

As will be seen by the report of our case, we do not think we are in error in considering it to be an inguinal hernia. guino-interstitial hernia was first definitely described by Berger, and, since this type remains within the limits of the external inguinal ring, it was suggested to call it hernia intrainguinalis. It is evident from the literature of the subject that interstitial hernia, that is to say, located between the external oblique and fascia transversalis, has given rise to considerable discussion, perhaps in reality more than the subject deserves. In his statistics, Macready shows that only 0.93 per cent. of all hernias are of the interstitial variety, while Berger, out of 7151 cases of hernia, only found five of the interstitial variety, making only 0.07 per cent. It should, however, be remarked that interstitial hernia is of the greatest interest to the surgeon on account of its serious nature. Macready collected 169 cases of interparietal inguinal hernia and Göbell, 115. The latter collection deserves, perhaps, more notice, for it includes reducible as well as strangulated hernia, whereas Macready has only considered the reducible form.

The term of interstitial hernia has been employed in various senses, but many surgeons consider that only that form of hernia which lies between the external and internal oblique should be classified under this head, believing that other varieties are simply subdivisions of this group. We believe that Göbell is in the right when he considers that all herniæ lying between some layer of the abdominal wall are of the interstitial

variety Generally speaking, in a large majority of cases the diagnosis of interstitial hernia is attended with extreme diffi-culty, and, as far as the differential diagnosis is concerned, only fibroma need be thought of, because these growths are occa-sionally observed in this region, making their exit from the anoneurosis of the external oblique muscle. It is evident that the diagnosis of a hernia is made, but further than this it is difficult to decide the exact type with which one is dealing. The difficulty seems to lie in deciding whether one has to do with an inguinal or with a femoral hernia, and when the patient is a woman the diagnosis becomes still more faltering, because the frequency of the femoral variety in the female sex is well known In our case the general appearance of the her-nia, especially the large size of the external ring, rather led us to believe that the case was one of inguinal than femoral hernia The presence of a typical inguinal hernia on one side and another hernia upon the other side is of importance because a relatively large number of cases have been recorded where the inguinal variety was present on one side and a femoral hernia on the other, and Berger found out of 10,000 operations for rupture that an inguinal upon one side and a femoral upon the other was present in 111 males and seventy females. Interparietal herma is evidently more frequently met with in the male, and of the 115 cases collected by Gobell, only four were women, and it is well known that herma in general is four times as frequent in the male as in the female

Out of eleven cases of interstitual hermia collected up to the year 1900, not one was observed in the female, and I believe that Auvray, as far as I can learn, was the first to record a case of interstitual inguinal hermia in the female, and this he did in 1900, another case of the irreducible type in a young woman, operated upon by Helferich, was reported the next year by Müller Fredet also reported a case in 1901. This year two more instances have been related by Brunco in his thesis, "Zwei Fälle linkssettiger interstitueller Hernie beim Weib" operated on by Glaser.

Since a large number of the interparietal type and all the

cases of the interstitial variety recorded up to this year (1904), have been associated with displacement or some anomaly of the testicle, these conditions were naturally looked upon as the cause of the particular form of rupture. Cryptorchidism was more particularly dealt with. Göbell has calculated that, of all the cases of interparietal hernia that he has been able to collect, 59.1 per cent. were cryptorchids, and that in his eleven cases of interstitial hernia all presented this anomaly. Retentions of the testis, whose relation with an abnormally narrow external inguinal ring will be considered later, can only be considered as an etiological factor of interparietal hernia in very rare instances, because only 10 per cent. of males afflicted with this condition presented this type of hernia; but Göbell, who makes this statement, refers, however, to certain congenital conditions as the origin of this form of rupture. He considers that all of his eleven cases of interparietal hernia, occurring between the external and internal oblique, were congenital. In one case recorded by Brunco, the patient stated that the hernia had been present exactly three years, but one should recall to mind that oftentimes an inguinal hernia may exist for many years in the female, and yet the patient's attention not be drawn to it; and then, again, one should recollect, as Lockwood has pointed out, that in exceptional cases a loop of mesentery may be inserted so high up and it may be so short that a complete extrusion of the gut through the rings would be practically an impossibility, in which case we are dealing with a so-called incomplete hernia. An internal inguinal ring with a very high situation has been recorded by Bramann in a case of an inguinal hernia lying between the external and internal oblique muscles, in a four-yearold boy. Close to the border of the ring the testicle was found. In another case recorded by Schmidt and Butz the internal ring was five centimetres higher up than normal, and quite on a level with the anterior superior iliac spine. In Kleeberg's case the internal ring was not distant more than five centimetres from the external. Schmidt attributes this anomaly to a defective situation in the insertion of the ligament of the kidney. Bramann takes it for granted that there is a displacement of the

normally grown structures, especially in those instances where the lower border of the processus vaginalis only reaches as far as the aponeurosis of the external oblique muscle, and Berger has also mentioned abnormal conditions of the inguinal ring in females. From the resulting occlusion of the internal inguinal ring, it would appear that the narrowing of the external inguinal ring, which is so often observed, is the result of the changed condition of the internal. In the case which we report, the external inguinal ring was very large, perhaps I might say abnormally so, while, on the other hand, in a typical case of interstitial hermia recorded by Butz, the external ring was so small that the operator could not find it. Bull and Coley, in their article on Herma in Dennis's "System of Surgery," state that in the female there may be a hydrocie of the canal of Nuck preventing the herma from enlarging in the usual direction. This may be quite possible, but, so far as I am aware, no such case has been reported, unless the writers making this statement have had such instances under their observation, but of which they make no mention.

In the male, the narrowing of the external inguinal ring has been considered an obstacle for the complete descent of the testicle, and as a cause for the spreading out of the interparietal processus vaginalis behind the internal ring. In contrast to this, the hernice, which interest us more especially, have presented, in cases where the rupture was reducible, an abnormally large external ring. Be that as it may, these conditions, especially in the female, are still most indefinite and it would be well in the future if more detail were given in reference to them. The stretching and thinning of the aponeurosis of the external oblique, as observed in one of Brunco's cases, should not be in any way connected with the above-mentioned congenital defects, and, as he points out, was simply secondarily dependent upon the pressure of the hernia

Gobell goes into every imaginable supposition in order to explain the formation of interparted herma, but these we will omit from discussion and will consider the process as it occurs in females

As obstacles to the centrifugal mobility of the

hernial sac may be mentioned, firstly, the extreme obliquity of the inguinal canal or considerable loose tissue of the interstitial parts, thus predisposing the entrance of the hernial sac; secondly, a narrow external inguinal ring. The space between the aponeurosis of the external oblique and internal oblique forms a point of lesser resistance and would naturally be most favorable for the development of a hernia. It is almost surprising that not infrequently a hernia will push itself between the firm sheaths of the transversalis muscle and the fascia transversalis, and, in order to accomplish this, a rather powerful centripetal force must come into play.

Eppinger, who divides the inguinal canal into three portions, explains the frequency of inguinoproperitoneal hernia from the fact that there exist two especially weak spots in the last division of the canal, between the peritoneum and the fascia transversalis, thus favoring the development of a hernia between them.

Symptomatically, interstitial hernia forms an abdominal swelling when it makes its exit through the abdominal ring, or when the interparietal sac is greatly developed and contains a good sized contents. But it should be recalled to mind that there are instances of interstitial hernia where no tumefaction is present, as an example of which we may cite the inguino-properitoneal variety.

Statistics show that interperitoneal inguinal hernia occurs about twice as often on the right as on the left; and among the eleven cases observed by Göbell of inguinal hernias seated between the external and internal oblique muscles, only three were found on the left side. This authority believes that for this reason one is dealing, at least in the case of males, with a congenital hernia, for the reason that this process is more frequent on the right than on the left side, because the right testicle descends at a later period, and for this reason the right processus vaginalis remains patent longer than on the left.

Relative to the age at which interperitoneal hernias have been observed, it may be said that in the male, at least, the subjects have varied in age from twenty to forty years,—in other words, during the time when, from work, intra abdominal pressure is apit to be the greatest. One case in a boy four years of age has been recorded. On the other hand, in females with interstitual herma, the patients have, in most cases, been over fifty, although there is no hard and fast rule, for many cases have been recorded in younger females and even in little girls as in our case, and it is my impression that Mr. Bland Sutton has recorded a case in a female infant four months old, all though I am unable at the present time to find a reference to it.

though I am unable at the present time to find a reference to it.

The sac of an interstitual herma may be single or bilocular, in the latter instance there will be a hermal sac in the inguinal canal, and another in the interstitual tissue of the abdominal wall.

The prognosis of interstitial hernice which have not been operated upon is decidedly more unfavorable than that of in gunal hernia in general, because in the former their anatomical make up renders them far more hable to strangulation, and 50 per cent of Gobell's cases were examples of incarcerated hernia From these facts, therefore, it is evident that the only proper therapeutic measure is a radical operation, and the longer such hernias are allowed to go on without operation, especially if they are wearing a truss the more unfavorable will become the operative prognosis

No absolute rule can be laid down as to the technique to be employed, because the anatomical condutions will vary some what from one case to another, and it is evident that the operation will usually be to some extent a complicated one. A very complicated method for the radical cure of interstitial hemia has been suggested by Berger, who alternately sutures the muscles and layers of fascial over one another, the sheath of the rectus being drawn over in order to add strength. After a vertical separation of the anterior abdominal wall, the structures are brought over below and outward and this muscular transplantation is completed by several layers of burned sutures. Deforme and Championnere have each described their personal methods, which space will forbid us from considering and we will now briefly give the history of our case.

The patient, a well-developed girl nine years of age, was referred to us in August, 1904, by Dr. Robert D. Scales, of Dorchester, for a right-sided inguinal hernia. The patient had been passing her vacation in the country, when suddenly, one afternoon, she was taken with severe intra-abdominal pain, which was diagnosed at the time by a local physician as being due to appendicitis. The child was put to bed, the pain gradually subsided during the night, and the next day she was well again. From the subsequent findings at the operation, it was evident that she had suffered from a partial strangulation, but from the recumbent posture the gut had probably slipped back into the abdominal cavity, and no further disturbance arose.

Examination showed a normally developed, well-nourished girl, with excellent muscular development. Lungs and heart normal; abdominal viscera normal. In the right inguinal region, a tumefaction, the size of a small hen's egg, was to be seen extending downward towards the labium majorum, more or less pearshaped. With the patient standing up, a distinct impulse could be felt on coughing, and when the child was placed in a decubitus the swelling could be readily reduced. After reduction, the tip of the index-finger could be easily inserted through the external inguinal ring up the canal. Upon requesting the patient to stand up, another tumefaction was observed to occur somewhat above the inguinal hernia, and appeared to occupy the abdominal parietes. Impulse could be detected in this tumor when the patient coughed, and it also disappeared when she assumed a recumbent position.

This second tumefaction appeared at about the middle of Poupart's ligament, and when slight pressure was used it was made to disappear within the abdomen, accompanied by a slight gurgling. On deep pressure one was able to discover a rather oval gap at the site of the swelling, which easily admitted two fingers; and by exploration it was discovered that above and externally it appeared to be surrounded by rather tough bands of what appeared to be adhesions, while below the pubic bone formed its lower boundary. The pelvic vessels were felt directly below the lateral angle of this gap. Extending from the tuberosity of the pubis, a second gap, with sharply defined borders and triangular in shape, could be detected and easily admitted one finger.

The tumefaction above that of the inguinal hernial swelling

could only be produced when the patient stood up and coughed, so that a considerable amount of intra-abdominal pressure was brought to bear. When this was done the protrusion appeared at first to be directed towards the median line, but if the intra abdominal pressure was still continued, it deviated laterally. It could only be replaced when the patient was in a recumbent position, and this was accompanied by the characteristic gurgle, proving that the contents was composed of intestine.

An incision carried downward towards the external incinnal ring about eight centimetres long was made, and, after the skin and superficial fascia were separated, the aponeurosis of the ex-ternal oblique became visible and contained several longitudinal sulci parallel with Poupart's ligament The external inguinal ring was not very distinctly defined After slitting up the aponeurosis of the external oblique, the hermal sac immediately bulged out and, so to speak, unfolded itself from under the aponeurosis, and was found to extend above the internal oblique and downward underneath the aponeurosis The sac was ad herent to the superficial fascia at the level of the internal ring and after freeing it from the internal oblique the transversalis appeared to have no adhesion with it A lipoma was found connected with the hermal sac and was adherent to the fascia and symphysis pubis. This was separated, and a fairly well developed round ligament was discovered attached to it. The sac was then with some difficulty dissected away from all the surrounding parts and when this had been accomplished it was found that it extended through the transversalis, forming an opening large enough to admit two fingers. Within the herital sac three small lipomata were found, while the contents consisted of a loop of small intes tine

It was evident that the internal inguinal ring lay to the side in an abnormal position, and when the sac had been completely isolated and spread out, it was closed with catgut sutures and excised. The stump was allowed to drop back into the abdomen, and the transversalis was sutured to the border of the aponeurosis of the external oblique down to the sheath of the rectus, while the internal oblique was sutured to the upper border of the aponeurosis of the external oblique, and the lower border was brought over upward upon the aponeurosis, so that there were four rows of buried sutures overlying the hermal opening

The after events were simple, and the patient was discharged well at the end of three weeks.

LITERATURE.

Auvray. Gazette hebdomadaire, June 10, 1901. Brunco, C. Inaug. Diss., Erlangen, 1904. Göbell. Deutsche Zeitschrift für Chirurgie, Band lvi. Muller, R. Inaug. Diss., Kiel, 1901. Rochard, E. Les Hernies, Paris, 1904. Treves, F. System of Surgery, Vol. ii, 1896.

THE RELATION OF MECHANICAL DISTENTION TO THE ETIOLOGY OF APPENDICITIS¹

BY C VAN ZWALENBURG, M.D.

OF RIVERSIDE, CALIFORNIA

In a study of appendicatis, four conditions point the way to its etiology I The constriction, 2 The concretion, 3 The pathogenic germs, always present, and 4 The distention, observed in early operations

These have all been repeatedly commented upon in search ing for the cause. One other necessary condition is the hydrostatic pressure in the distended appendix. Pressure upon the blood vessels in the interior of the appendix lowers the resist ance and the germs do their work. If continued, it obliterates blood vessels and produces necrosis and gangrene. Many attempts have been made to explain the vascular changes by trauma or pressure from concretions, foreign bodies, or kinking or torsion, but the fact that the fluid can produce pressure upon blood vessels as well as solid bodies has been overlooked. What will furnish a more simply or satisfactory explanation than this fluid distention?

The appendix is essentially composed of a hard, resisting, muscular wall enclosing a mucosa and submucosa and covered with peritoneum. The blood vessels branching in the meso-appendix pierce the wall in many places and, ramifying the submucosa, supply the mucosa. The latter is rich in lymphoid tissue. The lumen contains mucus frecal matter, remains of food, and a rich supply of bacteria.

Given a constriction in any part of the lumen of the ap pendix with a concretion behind it (passing the mode of their formation for the present), let us briefly trace the process of

¹Read at the meeting of the Foothill Medical Circle of Southern Cahifornia November 16 1904 at Redlands California

distention and inflammation. In any one of a number of ways the concretion closes the opening in the constriction. Secretion from its numerous glands may furnish the first fluid in this closed cavity, or there may be a considerable quantity of fluid already present at the moment of closure; it may be sufficient to produce decided pressure immediately.

There are now three different fluids involved in this process, all subject to different pressures and separated by only the filmiest membranes.

- 1. The afferent vessels (the arteries) carrying fluid into the appendix at a pressure of, say, 125 millimetres mercury;
- 2. The efferent vessels (the veins and lymphatics) carrying fluid out of the appendix at from nothing to ten millimetres;
- 3. The fluid in the occluded cavity subjected to a pressure of, say, twenty-five millimetres, may be anywhere from ten to 100.

Hydraulics and dialysis tell us what follows in the struggle for hydraulic equilibrium. The efferent vessels which are within the resisting wall of the appendix will be more or less occluded by the greater pressure in the cavity. The capillaries responding to the obstruction beyond dilate and allow serum to escape; lymphatic drainage is blocked, effusion results. Every atom of fluid which remains within the wall of the cavity adds its pressure to that already present and causes greater obstruction to the efferent current. The arteries keep on pumping in the fluid at 125 millimetres; effusion continues, and the pressure in the cavity rises and continues to rise until it equals that in the arteries, and these pressures are balanced at 125 millimetres, or whatever the arterial tension may be.

Now, if this occurred in perfectly sterile surroundings, this balance might be maintained for some time without material harm; enough fluid would filter through to maintain life in the cell. But our cavity is far from sterile; that innumerable numbers and varieties of germs make this their home has been repeatedly demonstrated. With the circulation impeded, the tissue cells, deprived of their supply of food and oxygen, offer

little resistance to the attack of germs. The leucocytes are prevented from reaching the point of assault, the mouth of every follicle and gland and lymphatic is opened wider with every increase of pressure—doubtless microscopic trauma occurs. What more perfect conditions for "infection' can be conceived?"

With the increase of pressure and the infection infiltration, complete strangulation, necrosis, and gangrene follow. Our cavity is now a real abscess cavity, subject to the same laws of hydraulies, circulatory interference from hydrostatic pressure infection infiltration, necrosis, and advance in the direction of least resistance.

The comparison and detailed study of these processes in an abscess and in the appendix open an attractive field, but I cannot take time for that now

Assuming that the obstruction does not give way, necrosis appears, first in the most vulnerable portions, thin places in the wall, parts having the poorest circulation or those affected by the most virulent infection. These break down and we have a perforation. Or if the pressure and infection are about equal in all parts of the wall, or of sufficient intensity or char acter, gangrene of the entire enclosed cavity will result.

Time and again such appendices have been removed within twenty four to forty eight hours of the onset of the first symptoms, often they are so distended that the surgeon fears they will rupture during removal, often one or more black necrotic spots are in evidence, to which protective omentum has already become adherent, or the entire appendix or that portion distal to the obstruction has been found gangrenous, but still intact. Thus us the ideal appendix we all strive for by early operations, and fortunate is the patient who parts with it at this stage.

In my own experience this condition of distention ob tained in every case in which the time and character of the case made it possible Surgeons generally tell of such experiences and many promptly add, "I can see how your explanation will account for this class of cases" If for these then why not for

those in which perforation has already taken place. To be sure, the fluid has been disseminated or is confined in a local abscess, and the walls of the appendix are collapsed; possibly the entire appendix is wellnigh lost in the mass of necrotic tissue present. Still, the case found distended at thirty-six hours after onset would have been in this same collapsed condition if left until the third or fifth or eighth day.

I must put the same argument for those other cases in which the direction of least resistance drives the concretion out into the colon. Here even the concretion is lost, and the only evidence of the condition which prevailed a few hours or minutes before is the distensible cavity with inflammation beyond the point of constriction.

Nevertheless, is not the analogy complete? If the constriction will in time dilate sufficiently to allow the concretion to pass under the increasing pressure, that will be the direction of least resistance. The contents will be discharged into the cæcum and the injury done to the appendix will be repaired as best it can. If the infection has only begun or is of a mild character, repair will be easy, and the continuing appendicitis will be of the so-called catarrhal type. It may be so mild as to escape observation entirely, the patient never knowing that anything unusual occurred within his abdomen. If the concretion is not passed into the colon until the distention reaches a high point or until it has been a practical strangulation for some time, or if the character of the infection is very virulent, serious changes may have taken place, necrosis, even gangrene, may continue, or the infection may continue to advance through the wall of the appendix without necrosis and produce peritonitis, or it may follow any of the devious courses so inimical to appendicitis.

So far I have considered only those typical cases which contain a great amount of constriction, together with an actual concretion. Neither of these is, however, essential to the production of appendicitis nor to this explanation of its etiology. Strictly speaking, this distention is really a step in the early pathology of the disease, but, as it is the cause of the acute attack, it is indeed the cause of the illness which we call appendi-

citis. A number of conditions will vary the course and the final result of this obstructive process. The constriction may occur at any point in the course of the lumen from the colonic junction to within one half inch of the distal tip. Likewise it varies in size from the slightest narrowing to the tightest constriction. It may be only an unusually small valve of Gerlach or it may be a cicatrix encircling the lumen and closing it to a pin point opening. It may be only a kinking of the appendix

The obstruction need not always be a concretion A frecal mass of varying size and consistency may obstruct for a sufficient length of time to produce tension vascular changes and infection. Under these circumstances the infection will probably be less severe. In fact, a concretion is simply the insoluble morganic residue of faceal masses growing by accretion the organic matter disappearing by digestion bacterial action and solution. If the constriction is very tight possibly a plug of mucus might furnish the obstruction for a slight distention and a mild infection, the resulting congestion of the wall completing the closure.

The determination of the degree of tension necessary to produce infection opens up an interesting field for study and experimentation. The actual manner in which closure of the trap occurs must of necessity be partly left to conjecture. The most reasonable explanation is that it depends upon accidental circumstances. I have demonstrated on an appendix, which contained a concretion liow easy it is to force fluid into the appendix which by its recoil forces the concretion into the constriction and closes the cavity by a perfect ball valve. It seems reasonable from the suddenness and severity of many attacks that that does actually happen in many cases.

Anything increasing tension in the colon thus becomes re sponsible for the actual onset. Diarrhoza constitution fer mentation flatulence trauma athletic strain all these have been charged with being the cause of appendicitis and I can see how by increasing intracolonic pressure they may be the last straw which springs the trap. Often howeer I believe the

closure is purely accidental. It will come on during sleep; the position of the patient may favor it. The constriction and concretion may be ready for the final tragedy for months or years, and only await the accidental closure to bring on an attack. In fact, they are often found post-mortem after death from other causes.

It should be remembered that the concretion forms in the very mouth of the constriction, being moulded to a perfect fit by the frequent attempts of the appendix to empty itself. Still, it may for a long time remain a poor fit, and the moment pressure increases the valve leaks, the concretion falls back into its bed, and the attack is postponed. The same is true of fæcal masses.

No doubt one cause of closure is the attempt of the appendix to empty itself by the contraction of its muscular fibres, the presence of which is no longer a matter of doubt. Once closed, the appendix continues these attempts to empty itself, producing appendicular colic. This is to my mind the most reasonable explanation of the first colicky pain which is the most characteristic symptom of the onset of the disease. This "spasm," originating in the appendix, spreads to the adjoining colon and ileum, and is in some cases responsible for diarrhœa during the first few minutes or hours of the attack.

Rubin, in the Journal of the American Medical Association, Vol. xliii, No. 18, demonstrates how flatulence favors the entrance of colonic contents into the appendix. In so far as it does so, it favors the production of a plug as well as a closure of the constriction, and in that way may be a factor. After the trap is closed, the formation of gas from fermentation of the enclosed contents sometimes adds rapidly to the existing pressure.

R. Abbe ¹ has beautifully demonstrated the formation of strictures from the ulceration following an attack of appendicitis, several often occurring in the same appendix. That all narrowing of the appendicular lumen is thus produced does not however follow. Many of the irregularities of the appendix

are congenital The club-shaped, long, narrow, or short thick appendix, the kinks, the short mesentery, and numerous other constricting conditions are simply accidental and congenital, the simple result of the degeneration of a rudimentary organ Hence, a person is destined to have appendicitis some time during his life or not, according to whether he is born with a respectable appendix or not. And the pronounced attack is most likely to occur during the period of full development of these irregularities, not far from the period of adolescence.

These irregularities are often hereditary, like all other minute anatomical peculiarities, and that explains the hereditary features of the disease. I have seen it occur in two brothers and one sister within two years. The first attacks are usually mild, and doubtless occur during childhood, and are constantly overlooked both at that time and later in the history. What boy of ten to fourteen would think of remembering such little "belly aches"?

The natural irregularity of the lumen retards the passage of a faceal plug sufficient to allow a moderate distention to take place. It takes but little pressure to retard the venous and lymphatic current, lower the resistance to germs, to open the follicles and crypts of the appendix, perhaps produce minute traumatisms, and mangurate a mild infection before the lumen again becomes patulous. This infection by infiltration, ulceration, and cicartization tightens the stricture, and often produces others. How often do clinical histories report several such mild attacks months and years preceding the stormy one which ends in complete occlusion and resulting perfora

Occasionally a distended appendix is found which presents no gross evidence of active inflammation, or, if it does, it is very mild. This occurs as a result of an attack of appendicitis which has run its course. In the light of these studies, I would explain these by saying they are a result of the process of resolution, the infection being mastered by the tissues, and the lumen occluded by adhesive and cicatrical processes, a easity is left which becomes or remains distended by the hydraulic processes I have described, but as it contains no germs it produces no infection.

Sometimes a small cavity becomes permanently occluded; the few germs which it contains produce a mild infection and slight symptoms of appendicitis, but it is so mild that the germs are killed and the infection overcome without a perforation. The distention thus remaining may then continue indefinitely.

That this is indeed the explanation of the nature of appendicitis is emphasized by the following facts:

It is not sufficient to say appendicitis is due to germs which happen to lodge in the appendix as we can of most infectious and contagious diseases. No idiopathic germ can be charged with being the etiologic factor. We find no germs there which could be said to be introduced into the body for this special occasion. The germs involved in the process are normally present in the appendix in health.

The suddenness of the onset in many cases can hardly be explained except on the ground of a sudden mechanical change having taken place. The sudden cessation of spontaneous pain likewise indicates the giving away of a mechanical something which to the patient himself suggests the removal of some kind of an obstruction in the abdomen.

The inflammation, until it spreads along the peritoneum, is confined to that portion of the appendix beyond the particular constriction which causes the trouble. How often we find only the distal inch involved, and the balance of the organ proximal to the constriction as healthful as ever. Again, the inflammation is evenly distributed over that entire portion so involved, and that very early in the case, before it could have time to spread by continuity.

The frequency of necrosis and gangrene indicates mechanical obstruction. Simple infection does not do this except in abscess formation. The only abscess early in appendicitis is such as I have described occupying the lumen itself.

Then, why is the necrosis or gangrene confined to the portion beyond the stricture, unless that stricture is to blame for it? If the necrosis is due to infiltration pressure following simple

infection, why should it be content with a simple perforation? Why does it not spread to the balance of the appendix and the colon, the omentum or mesentery? Often we find a small, simple abscess just outside of the perforation with an infection so mild that it is arrested right there. Would such mild infection produce necrosis from pressure infiltration? Why, then, do not we have necrosis of other portions of the alimentary canal?

Almost invariably the stricture or kink will be found prominent in proportion to the severity of the attack. In mild cases comparatively little stricture will be found

To practically test the effect of tension upon this problem, I made a series of experiments on dogs. The appendix was ligated subperitoneally at its juncture with the colon. I am told that, strictly speaking, the dog has no appendix, that it is merely an elongated colon, but in shape, position, and general anatomical characteristics it resembles the human appendix so closely that for practical purposes it is an appendix.

An aspirating needle was passed through the wall of the colon into the lumen of the appendix, and through this the appendix was distended with tap water at any pressure de sired, a manometer being used for that purpose Cultures of Staphylococcus albus and colon bacillus were introduced into the appendix in a few cases

The experiments were detailed in the Journal of the Amer tean Medical Association for March 26, 1904 so I shall not repeat them here, but merely give the summary of results. There was no difficulty in producing the picture of appendicuts, but we found that the one essential condition for its production was that the organ be distended. In all cases in which this condition was complied with the results were strikingly typical of human appendicitis. The tension was varied from seventy five to 150 millimetres mercury, and continued for two hours or more, and in all these cases a typical appendicitis followed in twenty-four or forty-eight hours.

The other experiments of ligature simply, or of injection of cultures without a simple ligature, or with it all failed to

produce any effect upon the gross appearance of the appendix in twenty-four or forty-eight hours.

I find in the literature reports of a number of attempts to produce appendicitis in animals experimentally. The more important ones were those of Roger and Josne,² Cappelon,⁸ Beausenat,⁴ Nicholayson,⁵ Lipavski,⁶ Roux,⁷ Adrian,⁸ Mühsam,⁹ and Baudler.¹⁰ Usually the attempt was made to produce infection by some irritation or traumatism of the interior of the appendix. Several workers have injected cultures of various germs into the appendix. General infection through the blood was tried. After injecting virulent cultures of bacteria into the appendix and adding considerable traumatism, a limited infiltration is reported, but nowhere do I find a report of that general inflammation of all the coats of the appendix which gives us the picture which we call appendicitis.

In order to produce any results, the circulation must be retarded by distention and consequent pressure, and when this is done the germs normally present in the appendix promptly produce infection.

The practical bearing of this view of appendicitis upon the diagnosis and treatment is very evident. Some of its most valuable hints come from a careful study of the history of pain and tenderness during the first hours of the attack.

If the distention comes from a sudden increase of intracolonic pressure produced by athletic exertion, or accident, or gastro-intestinal disturbance (forcing fluid into the appendix, which, by its recoil, forces the concretion into the constriction, closing the ball-valve), the onset will be characterized by severe pain coming on suddenly. If the occluding mass is small or pliable and is forced out through the constriction by the increasing distention, there will be a sudden cessation of acute pain. If the occlusion is permanent (that is, if the plug is too large to pass, too hard to be compressed, and fits too accurately to allow of a leak), distention will increase until the circulation is arrested, and necrosis or gangrene will follow. After a time the nerve endings involved in that process will fail to report pain and the patient feels relieved, but we know it is only the lull before the storm, which breaks out with redoubled fury when the gangrenous tissues give way and allow the pent up flames of infection to burst out upon the pentoneum

I believe that in many cases we can diagnose these different conditions accurately by carefully studying the history. If I get a clear history of acute, colicky pain continuing less than an hour, or even two hours, with a fairly sudden cessation, I feel confident that the obstruction has given way, and that only a so called catarrhal appendicitis is to be expected. There will still be pain upon moving about or from rolling of intestines, and there will be tenderness upon pressure, but no more acute, spontaneous pain. This means inflammation in the appendix, but relief of the distention and strangulation.

Again, when the pain has been severe for several hours, there has been frequent vomiting and perhaps two or three at tempts at stool, there can be no practical doubt that the distention will not be relieved through the anatomical exit into the colon, but by rupture of the appendix, following necross or gangrene

If this acute pain gradually diminishes after six or twelve hours, it is quite certain that considerable gangrene is present, usually complete gangrene of the appendix beyond the constriction

The sudden reappearance of severe pain twenty four to twenty eight hours after beginning of the attack means pen tonitis following. There are, of course, cases on the border lines in which the actual condition cannot be known, but gen erally the distinction between the so called catarrhal cases and perforative ones can be made out and the presence of absence of peritonitis can practically always be determined.

A patient of mine recently gave a typical history of recur rent attacks of mild appendicuts in one sentence. She said "I would have severe pain for a short time, and then be 'so sore' for several days afterwards". This is the characteristic history Severe pain while the distention and strangulation continue, relief from acute pain as the obstruction escapes but continued tenderness from the inflammation meanwhile established, by the germs driven into the exsanguinated tissues.

The treatment as suggested by this theory may, in the first stage, be likened to that of strangulated hernia. The pressure upon the blood-vessels is practically a strangulation. strangulation is not promptly relieved, necrosis or gangrene will follow. We say, "Don't allow the sun to set upon a strangu-We may say with equal propriety, "Don't lated hernia." allow the sun to set upon a strangulated appendix." Could we always know what strangulation was or was not relieved, the indication would always be clear. Unfortunately, we cannot always be certain. Still, study, from this stand-point of distention as a cause, throws a flood of light upon the subject, and failure to make this diagnosis should be rare. Unfortunately, again, patients so commonly fail to call the surgeon during this early period, when it is simply a question of strangulation. In a large proportion of cases it is the resulting infection which claims the attention of the surgeon,—so often already a peritonitis. If the pain has been slight and of short duration, and only slight tenderness remains, it is safe to say that the case needs no treatment from that attack. Of course, he will probably have further attacks, and need his appendix removed on that ground. The appendicular colic is evidence of a constriction. A plug of fæces or a fæcal concretion will reform and sooner or later produce another attack. But for the present he is safe with a simple catarrhal appendicitis.

The possibility of dislodging this plug either into or out of the appendix by some form of taxis or massage occurs to me, but I have had no opportunity of testing it. As a matter of fact, we are rarely called early enough to apply it (within three or four hours), and many anatomical difficulties present themselves.

Operation, if performed at all, must be done before perforation, or peritonitis, supervenes. The question of early operation should be settled early, within twelve hours if possible, almost certainly within thirty-six hours, and at least within forty-eight hours of the onset of symptoms. It is impossible to

make rules by hours or by the severity of the pain Distention advances at such varying rates and the virulence of germs varies so greatly. The weight given to the evidence derived from a careful study of time and pain must depend upon the judgment and experience of the surgeon. It is comparative evidence and cannot be tested by a fixed measure. It should be only the most positive evidence that allows the case to go on with the assurance that only a mild attack without consequence is impending. When in doubt during these early hours, I ad vise operation every time. If the error is made of removing a catarrhal appendix early, no harm is done. It is even then a good riddance to the patient.

But appendicuts is treacherous, and more than time and pain must be considered. Sometimes the most serious cases have little or no pain during the first few hours All the symptoms must be studied, of course, but always bearing in mind the probable stage of the strangulation But, unfortunately again we are so often called upon to consider this question of opera tion when we know the case is one of peritonitis rather than ap pendicitis only It may be limited to a small portion of the peritoneum, may be a walled off abscess, but, nevertheless peri tonitis. The removal of all the infected tissue is now out of the question, and to my mind Ochsner has conclusively proven that a much larger percentage of such eases get well if left alone than if meddled with by operation A certain number will die with any kind of treatment, but my personal experience with both forms or procedure is overwhelmingly on Ochsner's side of this exceedingly serious controversy

In the presence of acute peritoritis a focus of acute infection is certain to remain after operation, and the danger of its spreading is immensely increased by the intestinal paralysis, the interference with the normal secretions of the peritoneum, and the removal of the barriers already thrown up by nature's protertive forces.

REFERENCES.

- ¹ Abbe, R. Medical Record, February 16, 1901.
- ² Roger and Josne. Rev. de Méd., Paris, 1896, Vol. xvi.
- ³ Cappelon. Thesis, Kristiania, 1897.
- Beausenat. (Paris), (Bulletins de la Soc. Anatomique de Paris, 1897), Rev. de Gyn. et de Chir. abdom., 1897.
- ⁵ Nicolayson, J. Nordiskt Nedic Ark., Stockholm, 1901, Vol. xxxiv, Heft 4, No. 24.
- ⁶ Lipavski. Russki Vratch, 1901, Vol. xxii, No. 22.
- ⁷Roux. Congress de Chirurgie, 1894, Lyon.
- ⁸ Adrian, C. Mitt. aus der Grenz. der Med. und Chir., Jena, 1900-01, Vol. vii.
- ⁹ Mühsam. Deutsche Zeitsch. für Chir., Vol. lv, 1900.
- ¹⁰ Baudler. Mitt. aus der Grenz. der Med. Chir., Vol. vii, p. 407.

TRANSACTIONS

NEW YORK SURGICAL SOCIETY.

Stated Meeting, November 23, 1904

The President, HOWARD LILIENTHAL, M D, in the Chair

MULTIPLE SPONTANEOUS FRACTURES

DR CHARLES L GIBSON presented a woman, forty mine years old, who gave a fairly well-defined specific history. Aside from this, her past history had apparently no bearing upon her present Seven years ago, a spontaneous fracture of the right ulna had occurred At the site of the fracture a lump, presumably a gumma, had previously been observed. This fracture had never united, and the patient stated that no attempt had ever been made to induce it to unite. Two years ago a spontaneous fracture of the proximal phalanx of the right middle toe occurred Seven months ago she fell out of bed and sustained a fracture and dislocation of the left shoulder. About three months ago she noticed a swelling over the right clavicle, and a spontaneous fracture subsequently occurred at the site of the tumor All these fractures were perfectly painless, and a considerable amount of function of the affected parts was retained Dr Gibson thought there was little doubt that the underlying clause of these sponta neous fractures was syphilis. In most of the cases of the kind on record, the bones united The patient had been put on specific treatment, but the speaker said he did not expect much benefit therefrom

DR ROYAL WHITMAN called attention to the fact that the fractured clavrele had apparently united The fracture of the shoulder, he said, could hardly be called spontaneous as it had been produced by a fall out of bed It was rather interesting that the fractures, aside from the one involving the phalanx of

one toe, were confined to the upper extremities. He recalled a number of cases of spontaneous fractures in children whose bones were congenitally weak, in one instance as many as twenty or thirty fractures having occurred. The patient was a boy who could at one time hardly turn in bed without sustaining a fracture of some bone. He was kept in plaster-of-Paris for years, and finally recovered, although, as is the rule in these cases, a dwarf in stature.

OSTEOPLASTIC AMPUTATION OF THE LEG.

DR. HOWARD LILIENTHAL presented a man, thirty-eight years old, who, when he first came under observation, had a sloughing gangrene of one big toe, with threatened gangrene of several of the adjoining toes, the cause evidently being an arteriosclerosis. The affected toe was amputated, but the disease progressed; and it finally became necessary to amputate the leg, which was done in April, 1904.

As the cause of the gangrene was arteriosclerosis, with presumable hardening of the bones, the speaker said he regarded a simple amputation, done as rapidly as possible, as most advisable; but he was finally persuaded by Dr. A. V. Moschcowitz, who had had considerable experience with certain osteoplastic amputations, to try the osteoplastic method. In a much more promising case than this, in which Dr. Lilienthal had tried that method a year before, the patient became somewhat septic, necessitating removal of the bone-section. Subsequently, the patient became insane, and was transferred to Bellevue Hospital. In spite of the unsatisfactory result in that case, and in spite of the fact that an osteoplastic operation was apparently contraindicated in the case just shown, the operation was undertaken with Dr. Moschcowitz's assistance, and, contrary to the speaker's expectations, the result was excellent. There was a slight infection following the operation, due to the fact that the wound had to be left open, and one or two small superficial necrotic pieces of the fibula came away, but the main section of bone remained in place. The cicatrix of the stump was in a location where, under ordinary conditions, it would be painful; but under the circumstances it was not painful at all, and the man was able to bear considerable weight on it without inconvenience. The bones were eburnated, and so brittle that fissure of the tibia occurred on fracturing of the osteoplastic flap Division with the Gigli saw was very difficult. The stump left, however, was infinitely better than could be obtained by any of the ordinary methods, even with a periosteal cuiff. Dr. Lilienthal said he would certainly resort to the method again in similar cases, and in amputations of the femur also.

Dr. Whitman said it was rather peculiar that only one leg was affected. The speaker said that this condition of arteriosclerosis was not uncommon in comparatively young people, and especially among the Jewish race. These patients complained of pain in the legs and calves, often more pronounced at night, and of "weak feet," and an examination usually showed that the toes were of a deep violet color. Both lower extremities were generally equally affected.

DR LILIENTHAL, in reply to a question, said that the section of bone protecting the stump had been left attached by a periosteal lunge, so that it could be turned on itself. The fragment of bone should be handled as little as possible, otherwise, the periosteum was apt to become stripped off entirely.

Dr Lilienthal said that while these cases of gangrene resulting from arteriosclerosis were rare, he had seen and operated on quite a number of them As Dr Whitman had said, they appeared to be more common among the Jewish race, and every year a cer tain number of them came under observation at Mount Sinai Hospital The condition was usually bilateral, and in one case that had recently come under his observation, a young man of twenty-eight years, a Lisfranc amputation was necessary on one foot and a leg amoutation on the other side. In the case under discussion, the patient complained somewhat of the opposite foot, but the condition had not progressed to the point of gangrene As to the etiology of the condition, no positive statements could be made. The cases were variously described as Raynaud's dis ease, arteriosclerotic gangrene, and erythromelalgia. In its terminal stages, after the onset of the gangrene it was a disease of the blood vessels, usually of the arteries sometimes of the veins also, and apparently depending on some nerve lesion usually occurred in early middle life, and was seldom seen in old people In his experience, the oldest patient was fifty-six years It was unusual to get a syphilitic history in these cases, and he did not think that syphilis was an important etiological factor in the disease

A DEVICE FOR THE TREATMENT OF FRACTURE OF THE FEMUR IN CHILDREN.

Dr. Theodore Dunham presented this device.

DR. CHARLES N. Down referred to the difficulty of treating this form of fracture in children under one year of age. He referred to the device which the late Dr. Van Arsdale had suggested a number of years ago. This consisted of a triangular splint which was fixed between the flexed thigh and the body, to one side of which the thigh was bound. He had found difficulty in maintaining good apposition with this apparatus, and would certainly try Dr. Dunham's method if the opportunity presented. In older children he had found the suspension treatment very satisfactory.

DR. WHITMAN said that in his experience with fractures of the femur in, young children in the out-door service, union of the bone was usually very slow. This was probably due to the fact that the ambulatory treatment of these cases by the ordinary methods was unsatisfactory and difficult to carry out, because, as a rule, fractures in children united very readily. Even the method described by Dr. Dunham might be difficult to apply in this class because of the soiling and displacement of the plaster dressings.

Dr. Dunham, in closing, said it was a fact that nearly all of his cases were treated in the hospital wards. In answer to the statement that the treatment of fractures of the femur in dispensary practice was troublesome and not very satisfactory, and to the question whether any of his cases were treated in dispensary, he cited the case of a nursing infant fifteen days old which he had treated entirely in the out-door department by the method which he had devised, and, although the splint became more or less soiled, it did not become displaced. The child suffered very little discomfort, developed no irritation of the skin. and made a perfect recovery. Dr. Dunham said he had treated six cases in children by this method, and in all of them the bone united very promptly and with a singularly small amount of callus. In one case where the fracture occurred in the hospital ward and was promptly treated, it was impossible to feel any callus at all. One advantage of the method was that the limbs could be so easily inspected, and the course of the treatment, the deformity, etc., so carefully followed.

Stated Meeting, December 14, 1904

The President, Howard Lilienthal, MD, in the Chair

RESECTION OF THE STOMACH FOR CARCINOMA.

DR WILLY MEYER presented a man, forty nine years old, who, when he first came under observation in May, 1904, was in a very deplorable condition. At that time he had been suffer ing for a number of months from vomiting, and had become greatly reduced in weight and strength. There was a distinctly palpable tumor to the right of the median line in the epigastric region, and analysis of the stomach contents pointed to a tight stricture at the pylorus.

On May 6 the abdomen was opened, revealing a large mass.

at and beyond the pylorus, principally involving the upper hori zontal part of the duodenum It was very firm, and there were secondary deposits in the lesser and greater omentum in the shape of many minute snow-white appearing glands. The ques tion arose, whether to do a gastro-enterostomy or a resection On account of the comparative youth of the patient, and the possibility of entirely extirpating the secondary deposits, it was decided to do a radical operation. Between two large clamps the stomach was divided and almost the entire lesser curvature removed. The proximal end of the stomach was closed in the usual manner, and its cut surface inverted. In the course of closing the divided end of the duodenum by means of a purse string suture, one of the mesenteric arteries was accidentally wounded, and caused considerable hæmorrhage Prolonged compression failing to stop the latter, the vessel was finally singled out by compressing it between the fingers and surrounded with a cat gut ligature, which was gently tied As an additional safeguard the head of the pancreas was placed on top of the inverted and sutured end of the duodenum A posterior gastro enterostomy was then done with Murphy's button, and an omental flap stitched over the duodenum and the head of the pancreas

The patient made an uneventful recovery from the operation, and had since gained more than thirty pounds resuming his business. The button was passed on the fifteenth day. The mass in the stomach proved to be a carcinoma.

USE OF GUTTA-PERCHA IN OPERATIONS FOR CORRECT-ING NASAL BONY DEFECTS.

Dr. Robert H. M. Dawbarn said he had first employed gutta-percha in operations for correcting nasal bony defects about ten years ago, and upon several previous occasions had presented patients who were thus treated to the Society. The method was essentially as follows: A strip of dentist's gutta-percha was softened over an alcohol lamp, and then, before the patient was put under an anæsthetic, it was moulded over the nose until it exactly fitted into the particular deformity presented, and corrected it. It was then dipped into ice water and allowed to harden. The patient was then placed under an anæsthetic (general); next gauze is packed in each nostril, well back, to prevent blood running into the pharynx. Then a knife was inserted into the nostril, and the skin and periosteum as far as possible stripped from the nasal bone on the side on which deformity existed; the incision being carried up as far as the nasal junction with forehead and as close as possible to the infra-orbital vessels without wounding them. Often it is necessary to enter both nostrils to do this work -when the trouble is central. Next sterile tape soaked in diluted adrenalin chloride is packed into the cavity prepared for the new bridge, until in about ten minutes all bleeding ceases and the tape is removed. Into this incision the moulded piece of guttapercha is then slipped until it rests upon and corrects the nasal deformity. It is held in place by a small bandage on either side of the nose, and a strip of surgeon's plaster, and this completes the operation.

Dr. Dawbarn said he had now done this operation fifteen times, in one or two instances as long as ten years ago, and in every case, with a single exception, the correction of the deformity had been satisfactory and permanent, and the gutta-percha had remained unchanged and devoid of irritation. In one instance where he had endeavored to improve upon the work of the Lord, and create a Roman nose where none was intended, the tissues were stretched too tightly over the gutta-percha, resulting in inflammation of the skin, which finally broke down, revealing the gutta-percha underneath. In four of the remaining cases there was suppuration, but this soon subsided, and the final result of the operation was in no way impaired thereby. The nostril-cuts

are not sewn, and pus, if any, gravitates readily away from the new bridge

Dr Dawbarn said he was first induced to try this substance for the correction of nasal deformities by the suggestion of a den tist, Dr Kimball, of New York City, who told him that he had employed it for the purpose of crowding down a non malignant epulis, and had found it unitrating. The speaker said he considered this method preferable to that of injecting paraffin, which could not be relied upon to be permanent, and which in some instances had resulted in instant unilateral blindness, and in other had gradually changed its shape, with a poor final result. Also, the paraffin injection method inevitably causes some tension where injected, and this violates the first rule of plastic work, which is to have all structures in abundantly loose contact.

DR ELLSWORTH ELIOT, JR, said that while the method of correcting bony defects described by Dr Dawbarn was an excel lent one and a great advance in nasal surgery, he recently laid a case in which he thought it would not have proved entirely efficacious. In the case referred to, instead of the usual "sunkers ones" deformity, there was a decided increase in the transverse diameter of the organ. This was corrected by a subcutaneous osteotomy. An incussion was made, and the two bones were forcibly crowded inward and at the same time forward.

DR. LILIENTHAL asked Dr. Dawbarn whether he had tried the gutta percha material for the purpose of filling bony defects tollowing osteomyelities? In those cases various paraffin-indoform mixtures were now being used, but if gutta percha was as unirritating as Dr. Dawbarn had described it should be an ideal material for such purposes

DR DAWBARN, in closing, said that two of his cases of nasal deformity were of the type referred to by Dr. Eliot, and the operation comprised two different steps. First, the bones were divided by narrow closel or stender-jewed bone-forceps, and then crowded over towards the median line. After an interval of some months, to allow the inflammatory symptoms to subside, the gutta percha plate or bindge was moulded to fit the hollow in the skin, and then was inserted, in the manner described, upon these remnants of bone as a bed

In reply to Dr Lilienthal, Dr Dawbarn said that about two years ago, at the City Hospital, he operated on a case of necrosis of the tibia. The sequestrum was removed, and the remaining bony defect, which was of considerable size, was filled with gutta-percha. Unfortunately, doubtless on account of some defect in the technique, suppuration occurred. Under proper conditions the speaker thought that this material might possibly be entirely satisfactory for the purpose of filling these bony defects, and certainly deserves a further trial.

CHRONIC LARYNGEAL STENOSIS.

DR. JOHN ROGERS presented a man, twenty-five years old, who had a severe attack of typhoid fever in 1900, followed by acute cedema of the larynx, which necessitated a tracheotomy. The acute condition gradually subsided, but left a permanent stenosis with ankylosis of one arytenoid cartilage, and the breathing became so difficult that a tracheal cannula was constantly worn. Under cocaine, the trachea was dilated with urethral sounds until a No. 45 F. was admitted. A modified O'Dwyer intubation tube was then inserted, which the patient was still wearing. The modification, which was devised by Dr. Rogers, consisted essentially of an attachment projecting at right angles from the centre of the tube through the tracheal fistula. This attachment was removable, and after the insertion of the tube was screwed into the tube through the fistula, thus keeping the fistula patent and the tube in place.

HÆMORRHOIDS.

DR. LILIENTHAL presented a young man who had recently been operated on for hæmorrhoids by the clamp and cautery method. After the masses, which were fairly large, had been clamped and cauterized, the skin was elevated at the mucocutaneous junction with the mouse-tooth forceps, and a cut radiating from the anal aperture was made with the scissors: then another and another similar cut was made, until there were five or six radiating incisions. Dr. Lilienthal said he had adopted this modification of the ordinary clamp and cautery operation some years ago, because he had found that by making these incisions there was not only no pain following the operation, but it also prevented the occurrence of dangerous ædema of the parts, with the possibility of subsequent infection.

Upon completing the operation, a dry dressing was applied,

and a light tampon tube inserted. After six hours this was replaced by a glycerin dressing

DR Rocens said that about a year or two ago he saw a case in the practice of a colleague where the patient nearly bled to death after a clamp and cautery operation for hæmorrhoids. He recalled another case, seen more recently, where the patient, who gave a history of blood in the stools, was found to have hæmorrhoids, which were removed by the clamp and cautery method Some hours after the operation, which was done out of town, the patient had a fatal hæmorrhage, and at the autopsy it was found that he had had an ulcerative colitis, and that the bleeding had come from an ulcer in the region of the sigmoid flexure

DR IRVING S HAYNES said he had always held the view that the pain complained of after the clamp and cautery operation was due to the fact that a bit of skin had been included in the clamp, and cauterized. In order to prevent this it had long been his custom to divide the skin before putting on the clamp, letting the incision extend a short distance into the rectum. Since adopting this method, he had never heard the patient complain of pain after the operation.

DR GEORGE E BREWER said that while he favored the clamp and cautery method, his experience with the unmodified operation had been similar to that mentioned by Dr Lilienthal in regard to subsequent pain. Another disadvantage was the possible occurrence of a large cherry like swelling, resulting from cedema of the mucous membrane, which the patient was aptoregard as a harmorrhoud that had been overlooked. In order to prevent this, Dr Brewer said he had adopted the use of a rather thick spool shaped plug made of a drainage tube, surrounded by gaize, and shaped so that the gaize came in contact with all the cut surfaces. This prevented hemorrhage and in fection, and by pressing the plug well upward every vestige of micous membrane was forced inside, and the possibility of subsequent cedema avoided.

Dr. Dawdarn said he was first induced to use a rather stiff rubber drainage tube by a disagreeable experience he liad some years ago. In that instruce a soft tube, wrapped with gauze, was inserted into the rectum after an operation for hiemorthoids. On the third day reversed peristalsis set in and the tube, with the gauze, was drawn upward into the bowel. The tube was

removed without any trouble, but, in order to extract the gauze, it became necessary to anæsthetize the patient and bring it down with much difficulty, from the sigmoid by massage plus a uterine forceps. Cathartics and enemas had been tried, but proved ineffectual. At present, Dr. Dawbarn always in such operations fastens gauze and tube for wind-passage together with a big safety-pin; and this, linked with a second pin, is secured to the dressing outside the bowel

Dr. LILIENTHAL said the severe pain after the usual clamp and cautery operation was probably due to the ædema in a region that was peculiarly sensitive. Dr. Haynes, in dividing the skin surrounding the tumor before putting on the clamp, practically accomplished the same purpose as Dr. Lilienthal did in making incisions radiating from the anal opening.

TRANSTHORACIC RESECTION OF THE LOWER END OF THE ŒSOPHAGUS IN A DOG, UNDER NEGATIVE AIR-PRESSURE IN SAUERBRUCH'S BOX. A PERSONAL EXPERIENCE.

Dr. WILLY MEYER read a paper with the above title.



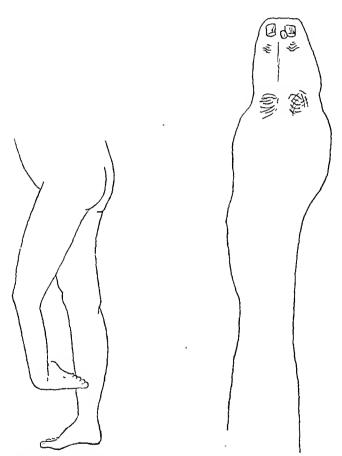
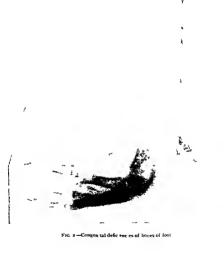


Fig. 1.—Walking on dorsum of foot. Toes distinctly backward,

Fig. 3.-Left hand.





 Γ IG 4—Congenital deficiencies of bones of hand

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, December 5, 1904

The President, HENRY R WHARTON, M D, in the Chair

CONGENITAL DEFICIENCIES OF BONES OF FOOT AND HAND

DR DE FOREST WILLARD presented a girl, eleven years of age, an only child, no hereditary or known cause for deformities At birth her left foot was noticed to be almost in a straight line with the leg. When she commenced to walk she was uncared for, and locomotion, until she was eleven years of age, was accomplished directly upon the dorsum of the foot, pushing the tarsus and metatarsus farther back until at time of examina tion she was walking with the foot absolutely reversed the extremits of the shortened tibia being the anterior point of weightbearing, and the dorsum of the astragalus and metatarsals being the rear point of support, the toes looking directly backward (Fig. 1) As the leg was six inches shorter than the other, from lack of development, she progressed only by bending the other knee sufficiently to accommodate the short leg The calcaneum, as will be seen by the skiagraph (Fig. 2), had been gradually pushed up behind the tibia, and was lying horizontally to the axis of the former. Other tarsal bones absent except portion of astragalus, fibula absent The right foot and leg were normal The right hand had but three fingers The left hand was a single mass like a flipper or mitten, without any division, and could not be flexed (Fig 3) The skiagraph showed, however, that there was a rudimentary carpus and metacarpus that the phalangeal bones of two fingers were present, with portions of the bones of the middle finger (Fig. 4) **4**6₹

The web was divided and the intermediate portions of bone removed; flaps were turned in and two fingers secured, which already (six weeks later) can be moved laterally sufficiently to permit the picking up of a pin, and will prove very useful.

The problem with the foot was a difficult one. An ampu-

tation would have been the simplest solution, but would have left the child with a very short leg. It seemed desirable not to disturb the lower tibial epiphysis, but to stimulate growth to adult life, or at least to puberty. To bring the posteriorly displaced os calcis to a normal right-angled position with the leg would have required resection not only of considerable portions of the tarsus, but also of the end of the tibia, and, as the leg would have still been six inches short, the use of an appliance for locomotion would have put a severe strain upon the ankle. It was therefore decided to bring the foot forward sufficiently only to permit the child to walk upon her phalanges in the equinus position, thus stimulating full growth of the leg as long as possible. An extension cork shoe, four inches thick, with lateral steel supports, will permit in time a good walking apparatus, leaving the question of amputation to be determined when adult life is reached.

The straightening process was accomplished by forcing the foot forward with powerful wrenches until the tarsus and metatarsus were brought into a forward obtuse angle with the tibia, and the phalanges were dorsal hyperextended to put them in the best position for weight-bearing. A gypsum dressing readily held the parts in situ for four weeks, after which walking was encouraged. As the operation was performed only six weeks since, the foot is, of course, still sensitive, but the prospects for a walking member are good.

DR. G. G. DAVIS said the important point in these cases is to determine the proper time for interference. He is now caring for a child of two years who has congenital deficiency of the fibula which allows the foot to turn outward and assume a valgus position. In these cases of marked deformity one is inclined to resort to immediate amputation. In Dr. Willard's case, however, the child has kept her foot until the age of eleven, and she now seems able to support the limb upon the toes, which is superior to an artificial leg. How early is it advisable to interfere in these cases? One can either amputate or fix the foot

into a longitudinal position. These limbs do not grow so fast as normal ones, and it is advisable to use appliances which do not interfere with the epiphyses to support the child while the limb is growing. When the growth is attained, some operation of turning the foot may allow an increase of several inches in length of the limb, and avoid the necessity of an artificial leg. In his case, Dr. Davis can keep the foot at a right angle to the leg, and with the addition of a cork shoe four inches thick the child can walk, and even play with other children. Meantime the bones are growing

EXSTROPHY OF THE BLADDER

DR RICHARD H HARTE presented a boy, aged nine years, who was referred to him by Dr T S K Morton in April, 1001 He was fairly well nourished with a family history absolutely negative On admission to the Pennsylvania Hospital he pre sented all the characteristic signs of exstrophy of the bladder, with an absence of the anterior abdominal as well as the bladder wall, causing a bulging forward of its posterior surface, the two presenting an exposed area about the size of an orange At the bottom of this protrusion could readily be seen the ureters as two well marked papillæ, from which the urine was discharging The surrounding tissues were red, inflamed, and excoriated from the constant flow of urine. The penis was rudimentary and with a marked epispadias A small hernia existed on both sides, with undescended testicles There was apparently no lack in the bony development about the pelvis After careful considera tion of the existing conditions it was thought that the anterior defect could be closed by a plastic operation. The method which naturally suggested stself was that recommended by Wood Be fore anything could be done, however, it was necessary to get rid of all the inflamed and excoriated condition which pre sented around the part. The child was placed in bed with a large wet boric acid solution compress over the bladder, which was changed frequently in order to allow as little urine as possi ble to collect, or come in contact with the irritated surface This condition responded quickly to treatment, and in a few days the part presented practically a normal condition. Two weeks later the patient was etherized and a bellows shaped flap reflected from the abdomen and brought down and stitched to the bladder

margin after freshening the edges of the bladder defect. The result desired was that the handle portion of the bellows-shaped flap should correspond to and form a roof to the defective urethra. Before this flap was made, the area was outlined carefully with an aniline pencil. The tissues about the umbilicus were so thin that great difficulty was experienced in securing sufficient thickness of flap. This flap was then turned upon itself and brought out and stitched to the denuded edge of the bladder and upper surface of the penis, thus closing in the defect and leaving a fascial covered surface anterior, the cutaneous surface now forming the anterior wall of the bladder and corresponding to what ordinarily should be its mucous surface. To give a complete double cutaneous covering to the bladder, two flaps were dissected from the region of the groin and swung round upon their bases and stitched together in the median line. The upper wound was approximated as nearly as possible with silkwormgut sutures and allowed to granulate. The sutures used to fasten the flap to the posterior portion of the bladder were buried catgut, and for the superficial stitches silkworm gut and silk were employed. The uppermost wound resulting from the flap formation was closed with harelip pins and sutures of silkworm gut. There was an incision made in the left side to relieve tension on the lateral flap, but with indifferent success, and this wound was allowed to granulate.

The time consumed by this operation was one hour and twenty minutes. There was no shock, and the child reacted well. A small, soft rubber drainage-tube was placed in the newly formed bladder and the whole surface dressed with a large, wet boric acid compress, which was regularly changed every two hours to keep the part perfectly clean and free from any urinary collection. In two weeks all the stitches were removed and the wounds were in good condition. There was a slight defect remaining at the root of the penis through which the urine escaped. The child left the hospital four months after his admission, with the understanding that a subsequent operation was to be undertaken to further perfect this local condition.

In October of the same year he was again operated upon at the Episcopal Hospital in the hopes of securing a more perfect bladder. To do this Dr. Harte dissected out the rudimentary glans from the penis, thus leaving a loose flap of skin hanging down over the scrotum. Through this flap he made a fistulous opening with the Paquelin cautery and allowed it to cicatnze

In March, 1902, the boy was again admitted to the Pennsylvana Hospital, and the edges of the lower flap freshened and approximated to the still defective lower portion of the bladder, and closed with two rows of stitches, the top row being buried catgut and the superficial row being silk. This flap united fairly well, with the exception of a few fistulous gaps along its margin, through which urine escaped from time to time. The patient left the hospital, but again returned in May, 1903.

At this time the edges of some of the small fistulæ were refreshed and closed with silk sutures, which proved quite satis factory, except for a few little pin point openings through which a little urine escaped Finally, these openings were cauterized with a small electric cautery, and he was fairly successful in closing them While in the hospital at this time the patient contracted the measles, so that any further operative interference was for the time contraindicated He left the hospital in August, 1903 He returned again in the spring of 1004, when Dr Harte succeeded in closing the remainder of these openings. He then had him measured for a urinal, which he found could be worn without any difficulty To make this even more perfect, he is having a small retaining catheter placed in the orifice of the extemporized bladder to convey the urine down into the urinal without the escape of urine when the patient assumed a sitting posture, thus keeping the surrounding parts absolutely dry and free from urmary contact He now attends school, and to external appearances is perfectly normal

Da Harte, remarking upon this case, said that exstrophy, or extroversion of the bladder, is by far one of the most common congenital defects to be found in this viscus, and its frequency of occurrence makes it a subject of no hithe surgical importance. This difficulty is met with much more frequently in the male than in the female. It is attributed to many causes, none of which are fully understood, such as the rupture of the allantois during intra-uterine life, possibly as the result of a fall on the part of the mother. A more recent investigator on the subject, Reichel, bears out the theory of the older surgeons, that the majority of the unformations of the urinary bladder and urethra, and

especially clefts of these organs, are simple failures of development. These different forms of abdominal clefts and epispadias occur on account of total or partial failure of fusion on the margins of the primitive embryonic structure. It is possible that the pressure of an amnionic fold may interfere with such fusion.

The deformity, which is more common in the male, consists in the absence of the anterior wall of the bladder with a corresponding deficiency of the lower abdominal parietes, and frequently the pubic symphysis. The penis in the male is epispadic and shortened, and the clitoris in the female is split in two portions, corresponding to the nympha, the anterior commissure of the vulva being wanting, and the bladder and urethra thus opening between the labia and directly into, or immediately above, the vagina. The uterus is usually well formed. The scrotum not infrequently contains a hernia on one or both sides. The rectus muscle is usually separated and passes out to its attachment on the pubic bone. In a certain percentage of cases this separation is continued up to almost their costal attachment, in which case there is no umbilicus.

The appearance of a case of exstrophy of the bladder is quite characteristic. The posterior wall of the bladder covered with mucous membrane is pushed forward by the abdominal viscera and forms a prominent but reducible tumor in the situation of the pubes. The mucous surface, which is red, papillated, and vascular, is continuous at its periphery with the abdominal walls, the juncture being a thin cicatricial appearing edge. At the lower part of the projecting vesicular surface will be seen the orifice of the ureters giving exit to the urine by drops or sometimes a small stream. The head of the penis consists of two thick swellings, beneath which the skin hangs down in the form of an apron. The seminal vesicles with the openings of the seminal canal are visible in the posterior wall of the divided urethra. The prostate may be normal, although it is usually rudimentary and may be wholly wanting.

Treatment.—In dealing with this condition, three methods have been devised. First, removal of the bladder and suture of the ureters in the urethral gutter. Second, implantation of the ureters in the intestine, thus converting the rectum into a cloaca which will tolerate the presence of urine for long periods.

And, third, an attempt to form a new bladder by the various plastic methods

The first method of deviating the urinary stream possesses certain advantages in its simplicity, as usually one operation will suffice, whereas by the other methods considerable time will be required to accomplish a satisfactory result. The bladder is freed and removed without opening the peritoneal cavity. The ureters are loosened for a short distance and stitched to the urethral gutter The defect in the abdominal wall is closed by lateral flaps, which are separated below and brought to the median line This leaves the orifices of the ureters well exposed, so that possibly they can be conveyed to a urmal, thus collecting all the urine A simple urinal could then be worn on account of the more favorable situation of the ureters By this operation the patient is freed from the severe pain caused by the ulceration of the prolapsed mucous membrane and from the risk of the inflammatory process extending to the kidneys He is also en abled by this apparatus to follow many of the vocations of life, and thus become a useful member of society

The second method, that of implantation of the ureters into the rectum, was devised by Simon, who bases his theory on the fact that in many animals a cloaca serves as a common receptacle for urme and fæces, and, further, that sometimes at birth the ureters are found opening into the rectum, and that patients, with a fistula between the bladder and rectum, in time learn to control more or less the escape of urne from the anus. In experiments on animals it has been found that the mucous membrane of the rectum was capable of withstanding the constant irritation of the urine, and that the sphincter of the rectum has succeeded in preventing its escape. In a case operated upon by Dr Dudle, Allen, of Cleveland, he was able to make use of the rectum with most satisfactory results so that the patient was able to follow the vocation of a clerk without any apparent in convenience on the part of controlling his urine But, unfor tunately, many of these cases thus operated upon terminate in a nephritis owing to an ascending pyelitis, the result of micro organisms finding their way up the ureters When this operation is resorted to, no doubt the risk of ascending preteritis can be lessened by transplanting into the rectum an elliptical piece of the base of the bladder containing the ureters, if this portion

of the bladder is transplanted well up into the sigmoid instead of the rectum, there will possibly be less chance of infection, as this portion of the bowel is usually empty, and consequently would be free from fluid, the escaping urine quickly gravitating to the rectum. It must be remembered, however, that this operation, though very brilliantly conceived, is accompanied with no little risk as simply the result of the rather complicated operative procedure, which must necessarily be within the peritoneal cavity.

The plastic operations, varying more or less in their details, have been employed for the relief of exstrophy of the bladder with most gratifying results in many instances. To Joseph Pancoast, of this city, belongs the honor of having in 1858 performed the first successful plastic operation for exstrophy of the bladder. His method consisted in taking flaps from the groin and inverting them over the protruded organ, attaching them together in the median line, thus forming a broad granulating surface which slowly cicatrized.

Professor John Wood, of England, operated upon a large number of cases, employing the method which is usually known by his name. This was the method employed in the case presented, with a slight modification. It consists in the use of three flaps, one taken from the umbilical region and inverted over the bladder, and the other two taken from each groin and united over the first one, which they cover in. The advantage of the inverted umbilical flap is that it effectually prevents the escape of urine in the upward direction, while the groin flaps cover in the raw surface of the umbilical flap without undue tension, and, having broad bases, are in no danger of sloughing. In the case of a male it may be possible to form a roof for the urethra at a subsequent operation by inverting flaps on the newly formed covering of the bladder and from the sides of the penis. By this operation the patient is placed in a very comfortable condition. Incontinence of urine exists to a certain extent, and necessarily continues, requiring the use of a urinal or some similar contrivance, but the bladder is effectually protected from irritation and excoriation is readily prevented. The principal points which require attention in the after-treatment are to prevent tension on the flap, which encourages the contraction of the granulating surfaces; this can be done by keeping the patient in an almost sitting position, with the knees flexed over a pillow. In an

adult, trouble may be experienced by the growth of the pudendal hairs on the inverted flap, and it may be necessary from time to time to practise evulsion with suitable forceps until the inverted surface shall have lost its cutaneous character and becomes as similated to microus membrane. This condition, however, is not hiely to occur if the patient is operated upon early in life

To relieve the vesical catarrh and the deposit of phosphates in and about the outlet of the extemporized bladder injections of dilute acetic or muriatic acid will be found the most satis factory way of dealing with this sometimes annoying condition

DR J B ROBERTS said he had never succeeded in closing an exstrophy of the bladder as well as the one exhibited nearest approach to it was one in which he made an opening for the urine in the perineum, keeping it open by rubber tubes while the bladder was closed in from the top Several little fistulas gave trouble, as in Dr Harte's case A year or two after the operation the bladder was found to be completely filled with small stones, operation for their removal terminated fatally from previous involvement of the kidney by an ascending infection Of late years Dr Roberts is inclined not to interfere in cases of exstrophy of the bladder unless they are very large, small ones are probably better let alone In one patient, a young lady, he had intended to transplant the ureters into the rectum, but, greatly to his satisfaction, she did not return for the operation Dr Roberts asked the opinion of the Academy as to the advisa bility of making an abdominal incision, cutting the ureters high up, and transplanting them into the small intestine

DR DE FOREST WILLARD said that, when operating upon boys, the surgeon is apt to forget that hair will grow on the turned in flap after puberty. Upon these hairs the urinary sediment will deposit and form calculi. He has secured better results by not inverting the umbilical flap. He makes it shallower than is usually recommended, and slides it down with the raw surface inward, two large lateral flaps are then made. He had found long lateral incisions of distinct value in relieving tension. Difficulty is always met in satisfactorily closing the lower part of the bladder. He considers very good the result secured by Dr. Harte. In girls and women the hair does not extend so far towards the umbilicus and a smoother and better flap can be obtained.

DR. JOHN H. GIBSON said the reported cases of transplantation of the ureters, with the trigone of the bladder, into the rectum seemed to indicate the lines along which future operations would be conducted. In the case exhibited, every one would admit that the plastic art had almost reached its limit, and yet the boy is still in an unfortunate condition. Early attempts at transplantation of the ureters failed, but later improvements gave better results, and the technique has now been still more improved by carrying the ureters into the sigmoid. This increases the danger of interfering with the blood-supply of the lower end of the ureters, but the operation can be safely done. If this operation continues to give as good results, plastic operations for complete exstrophy will cease to be employed.

DR. Horwitz said that he would be inclined to regard Dr. Roberts's suggestion as a very dangerous expedient. It is well known that if a colored liquid be injected into the bladder it gradually works its way up the course of the ureter, and is ultimately found in the pelvis of the kidney. Should the ureter be cut off close to the pelvis of the kidney and anastomosed to a loop of the small intestine, the danger of the development of a pyonephrosis would be greatly enhanced.

Dr. HARTE, in closing, said all surgeons recognized these cases as particularly difficult and trying. The one reported was exceptionally so, and the boy's condition when first seen was really pitiable. In considering cases of exstrophy, it is difficult to decide upon the operative method to employ. Theoretically, that of Simon seems very simple and satisfactory, but its mortality is high, and, if the patient recovers from the operation, he is almost sure to develop nephritis. Dr. Harte would regard the suggestion of Dr. Roberts to cut and implant the ureters high up as a serious and unscientific operation, as the fluid contents of the small intestine would readily pass up the ureter and produce infection. Dissecting out the trigone and transplanting it into the rectum carries along the valves of the ureters, and this tends to prevent ascending infection. If transplanted into the sigmoid, there is further advantage of the urine dropping away from the ureteral orifices; if placed in the rectum, the outlets are nearly constantly bathed in urines and fæces. case exhibited, Dr. Harte believes he tried to do too much at the first operation. His intention was eventually to utilize the penis in closing in the lower part of the opening, and the umbilical flap was fashioned for that purpose, but this step was not a success. The interior of the bladder now remains in an irritated condition, and there is a tendency towards collection of phosphates, but the latter are readily removed by weak acid solutions. If a child be operated on early the hair follicles in the inverted flap are destroyed, and there is no difficulty from this source if done later, the hair will grow and give trouble by becoming encrusted with a deposit of phosphates.

POSTERIOR DISLOCATION OF THE ELBOW WITH FRAC TURE OF THE CONDYLES OF THE HUMERUS RE DUCTION BY OPEN OPERATION SIX WEEKS AFTER THE INJURY

DR. HENRY R WHARTON detailed the history of a man, aged twenty-one years, who was admitted to the surgical ward of the Presbyterian Hospital, July 19, 1904, with the following history

About a month before his admission to the hospital he received a fall, injuring his left elbow. He was under treatment, but the nature of the treatment is not known. When admitted to the hospital, his left arm was extended and rigid at the elbow and there was marked thickening of the tissues about the joint. There was apparent displacement backward of the bones of the forearm. This diagnosis was confirmed by an X-ray examination, which showed also a united fracture of the lower end of the humenis. Under aniesthesia, an attempt was made to reduce the dislocation which was unsuccessful.

On August 1 the patient was anæsthetized, a longitudinal incision was made over the posterior aspect of the clow about six inches in length, and the dissection was carried down until the bones were exposed. The tendon of the triceps muscle was divided some distance above its attachment to the ulina, the capsule of the joint and lateral ligaments were freely divided, and by manipulation the bones of the forearm were drawn down ward, and the articular surfaces brought into their normal relation with the humeral articulation. It was found, however, that the reduction could only be maintained when the forearm was brought into a position at a right angle with the arm as in the leading of the fracture there had been a slight anterior projection

of the lower fragment of the humerus. After reducing the dislocation, a drainage-tube was introduced into the wound, and the capsular structure and the divided tendon of the triceps muscle were approximated with chromicized catgut suture. As the forearm had to be kept at a right angle to the arm, some difficulty was experienced in approximating these structures. The superficial wound was closed, and a plaster-of-Paris bandage was applied from the tips of the fingers to the axilla. The patient did well after the operation, and at the end of three weeks the wound was sufficiently healed to allow him to begin the attempt to make motions of the elbow-joint.

When he left the hospital, September 29, he had fair motion at the elbow-joint. Examination at the present time shows that the patient has a very slight disability of the arm, and was doing ordinary laboring work.

FRACTURE OF SECOND CERVICAL VERTEBRA, WITH RECOVERY.

Dr. Orville Horwitz exhibited a man who one year previously had sustained a fracture of the second cervical vertebra. The man had been injured by the fall of a heavy weight striking him on the shoulder and knocking him over backward, striking the back of his neck on a "roll of goods." At first he was stunned. On recovering consciousness he was enabled to get into a trolley-car and ride for a distance of about eight miles. He then walked to his home, which was about a quarter of a mile. He sent for his physician, who found him suffering from great pain and stiffness in the back of the neck. No displacement or irregularity of the spine could be detected. There was no anæsthesia or paralysis. The next morning there was complete paralysis, which lasted for about eight days. The patient was confined to the recumbent posture for about six months. It was found that he was more comfortable propped up in an armchair than he was in bed. At the present time the neck is stiff. A well-marked, hard swelling can be easily felt over the spinous process of the second cervical vertebra. He can do light work and lift about twelve pounds. The case belongs to the class spoken of by Mr. Simon as "latent fracture of the spine." A report of a number of similar cases is to be found in the literature of the

subject, notably those of Phillips, Cline, Bayard, Smith, May, Eberman, Ashhurst, Parker, and Debenham The points of in terest in the case are that an individual with so serious an injury as fracture of the second cervical vertebra should be able to ride eight miles in a trolley car, then walk for a quarter of a mile to his home, the appearance of paralysis on the second day, which disappeared in a week, and, finally, a gradual but almost complete recovery

DR DE FOREST WILLARD recalled two cases in his practice of recovery following fracture of a cervical vertebra One was a boy who complained of severe pain in his neck, and there was slight discoverable movement of the fragments The patient was kept for four months in a plaster neck dressing, and all the func tions except rotation returned In several other cases fracture was suspected or at first considered certain, because of pain and rigidity, but rapid recovery indicated that the symptoms were due to hæmorrhage within the spinal canal In Dr Horwitz s case, however, recovery was rapid, and yet a fracture was pres ent A peculiar case also occurring some years ago was that of a man who, by a fall down an elevator shaft, fractured his odon told process, yet walked fourteen squares complaining only of severe pain in his neck. The following morning he felt so well that he wished to go back to work, but this was prevented In less than twenty four hours he was paralyzed below the level of the fracture, and in another twenty four hours was dead. The odontoid was found to be broken entirely through but dis placement of the fragment did not take place until the second day, when resultant pressure on the cord caused death

DR RICHARO H HARTE said the case reported was an illus tration of the fact that severe injuries in the neck may give rise to few or no symptoms He cited the case of a brakeman who was struck by the step of a caboose, sustaining fractures of the jaw and clavicle This man walked more than a mile to the hospital, where his fractures were dressed and he was put to bed He did not complain of his neck, but shortly after turned in bed and died instantly Autopsy revealed a complete fracture of the odontoid process, and also of the bodies and spinous process of some of the cervical vertebree Dr Harte believes that many fractures of the cervical vertebre go unrecognized the man just mentioned might have recovered from the other vertebral of the lower fragment of the humerus. After reducing the dislocation, a drainage-tube was introduced into the wound, and the capsular structure and the divided tendon of the triceps muscle were approximated with chromicized catgut suture. As the forearm had to be kept at a right angle to the arm, some difficulty was experienced in approximating these structures. The superficial wound was closed, and a plaster-of-Paris bandage was applied from the tips of the fingers to the axilla. The patient did well after the operation, and at the end of three weeks the wound was sufficiently healed to allow him to begin the attempt to make motions of the elbow-joint.

When he left the hospital, September 29, he had fair motion at the elbow-joint. Examination at the present time shows that the patient has a very slight disability of the arm, and was doing ordinary laboring work.

FRACTURE OF SECOND CERVICAL VERTEBRA, WITH RECOVERY.

Dr. Orville Horwitz exhibited a man who one year previously had sustained a fracture of the second cervical vertebra. The man had been injured by the fall of a heavy weight striking him on the shoulder and knocking him over backward, striking the back of his neck on a "roll of goods." At first he was stunned. On recovering consciousness he was enabled to get into a trolley-car and ride for a distance of about eight miles. He then walked to his home, which was about a quarter of a mile. He sent for his physician, who found him suffering from great pain and stiffness in the back of the neck. No displacement or irregularity of the spine could be detected. There was no anæsthesia or paralysis. The next morning there was complete paralysis, which lasted for about eight days. The patient was confined to the recumbent posture for about six months. It was found that he was more comfortable propped up in an armchair than he was in bed. At the present time the neck is stiff. A wellmarked, hard swelling can be easily felt over the spinous process of the second cervical vertebra. He can do light work and lift about twelve pounds. The case belongs to the class spoken of by Mr. Simon as "latent fracture of the spine." A report of a number of similar cases is to be found in the literature of the

subject, notably those of Phillips, Chne, Bayard, Smith, May, Eberman, Ashhurst, Parker, and Debenham. The points of in terest in the case are that an individual with so serious an injury as fracture of the second cervical vertebra should be able to ride eight miles in a trolley-car, then walk for a quarter of a mile to his home, the appearance of paralysis on the second day, which disappeared in a week, and, finally, a gradual but almost complete recovery

DR DE FOREST WILLARD recalled two cases in his practice of recovery following fracture of a cervical vertebra. One was a boy who complained of severe pain in his neck, and there was slight discoverable movement of the fragments. The patient was kept for four months in a plaster neck dressing, and all the func tions except rotation returned In several other cases fracture was suspected, or at first considered certain, because of pain and rigidity, but rapid recovery indicated that the symptoms were due to hæmorrhage within the spinal canal In Dr Horwitz's case, however, recovery was rapid, and yet a fracture was pres ent A peculiar case also occurring some years ago was that of a man who, by a fall down an elevator shaft, fractured his odontoid process, yet walked fourteen squares, complaining only of severe pain in his neck. The following morning he felt so well that he wished to go back to work, but this was prevented. In less than twenty four hours he was paralyzed below the level of the fracture, and in another twenty four hours was dead The odontoid was found to be broken entirely through, but dis placement of the fragment did not take place until the second day, when resultant pressure on the cord caused death

DR RICHARD H HARTE said the case reported was an illustration of the fact that severe injuries in the neck may give rise to few or no symptoms. He cited the case of a brakeman who was struck by the step of a caboose, sustaining fractures of the jaw and clavicle. This man walked more than a mile to the hospital, where his fractures were dressed and he was put to bed. He did not complain of his neck, but shortly after turned in bed and died instantly. Autopsy revealed a complete fracture of the odontoid process, and also of the bodies and spinous process of some of the cervical vertebrae. Dr. Harte believes that many fractures of the cervical vertebrae por unrecognized, the man just mentioned might have recovered from the other vertebral

fractures if the odontoid had not been broken. The X-ray now determines the presence of fractures that formerly would not have been diagnosed.

DR. Francis T. Stewart, in support of Dr. Harte's statement regarding unrecognized fractures of the spine, mentioned two cases in which such injury was not actually suspected, but was revealed by the X-ray during a routine examination. The first case was that of a boy who had been run over by a cart and had both clavicles fractured. His neck was stiff, as would be expected in such an injury, but there were no symptoms referable to the spine or spinal cord. The X-ray showed a fracture of the arch of the sixth cervical vertebra. The boy recovered. The second case was seen some months after the receipt of injury; the neck was stiff, and the X-ray revealed a fracture of the sixth cervical vertebra. No symptoms referable to the spine had occurred, and no callus had formed. The patient could rock his head anteroposteriorly, but could not turn it from side to side.

Dr. John B. Roberts mentioned the case of a man who slipped and fell squarely on his buttocks. This was followed by paralysis of all the extremities. The man gave a history of an injury to his neck some six months before, at which time a fracture had occurred, and a finger introduced into the mouth could detect a mass in the region of the fourth or fifth cervical vertebra. The probable explanation of the paralysis after the fall is that the sudden jar tore some of the adhesions around the former injury and caused hæmorrhage. This supposition is supported by the fact that in twenty-four hours one arm had entirely, and the other nearly, regained its power. Motion of the legs then gradually returned, followed by sensation. At the end of six months he had almost perfect use of all four extremities. Dr. Roberts had considered the pressure due to blood, but he notes that Dr. Horwitz believes such palsies are caused by serum.

Dr. G. G. Davis said that, if in these cases of fracture paralysis is absolute at the time of injury, the prognosis is bad. He has seen two cases of recovery from apparent fracture of the cervical vertebræ some years after the injury. One is a man who received the fracture thirty years ago, the other a boy; both have deformity of the neck. The man has no paralysis, the boy has partial paralysis of one arm.

LUXATIO ERECTA AT THE SHOULDER

DR C N MONTGOMERY reported the case of a man, about sixty four years of age, who came to the Polyclinic Hospital on the 5th of September, 1904, giving the history that two days previously he had missed his footing on a loose step in the dark and fallen, his right arm being raised in an effort to save himself Shortly afterwards he was seen by a physician, who told him he had had a stroke of apoplexy, the limb presumably being para lyzed at that time Since his miury he had been unable, on account of the pain, to bring his arm to within but little less than a right angle of his body. As he lay on the bed the arm was at an even higher level, his head resting on his hand, a position that secured him the most comfort. On account of the pain it could not be brought to any extent below the horizontal The head of the humerus was plainly palpable in the axilla below the glenoid cavity There was paresis of the limb and numbness, sensation being preserved Traction and pressure were employed for some time, but reduction did not take place till he had received a small amount of ether, when the head of the bone readily slipped into the glenoid cavity A Velpeau bandage was applied for several days, and thereafter he received treatment at the massage clinic

When seen about ten weeks later there was considerable wasting of the deltoid and of the arm and forearm muscles. The fingers were flexed, and there was almost no power to grip Extension of the fingers was almost nil. Active pronation of the forearm was fair, but supmation was much restricted. He could flex the elbow well. At the shoulder-joint movements were possible in all directions, though much limited. Forced abduction would raise the arm to an angle of only 45° with the body. There was numbness over the outer side of the biceps and back of the upper part of the arm, over the outer side of the elbow and back of the forearm and wrist, not over the hand Pricking with a pin point over this area produced a numb sen sation.

The marked elevation of the arm in this case of subglenoid dislocation, and the difficulty experienced in attempts to lower it, together with the findings of the radiograph, established the diagnosis of luvatio erecta. This rare condition was first

described by Middledorpf and Scharm in 1859. Stimson had been able to collect only eleven cases up to 1899, and Vaughan reported a case in April of this year. It is of interest to note the primary diagnosis of apoplexy, and the effects on the brachial plexus following the two days' pressure before reduction was performed.

DR. G. G. Davis believes that nearly all dislocations of the shoulder are subcoracoid instead of subglenoid. In all cases the head of the humerus comes out anteriorly to the long head of the triceps muscle. The width of the head covers the entire distance between the long head of the triceps below and the coracoid process above, and moves forward more than downward. The head of the bone is felt in the axilla, even if the dislocation is subcoracoid.

STRANGULATED GANGRENOUS PERFORATED FEMORAL HERNIA WITHOUT SYMPTOMS, COMPLICATED BY SUPPURATING ADENITIS.

DR. GEORGE G. Ross reported the case of a young woman, aged seventeen years, who had a good family and previous personal history. For one year prior to the trouble under consideration, she had had occasional attacks of pain in the right iliac fossa, never severe enough to confine her to bed.

Three days before admission, she noticed a swelling in the right groin, which was painful and tender. On the following day the pain had increased, and the mass had become red and very tender. On the day of admission the pain was severe, radiating to the right side of the abdomen and down the right thigh. She had one attack of vomiting during the three days. The bowels had not been opened for two days.

On admission the temperature was 101.2° F.; pulse, 100; respirations, 28. Physical examination proved that the heart and lungs were normal. The face was flushed and anxious. The tongue was coated. There was a painful, tender, red, fluctuating mass in the right groin, the pain of which extended to the abdomen and thigh. The patient gave no venereal history or evidences of a venereal lesion. There were no abrasions or foci of infection of the extremity.

Calomel and salts were given, and acted promptly and thor-

oughly, without pain or marked discomfort. The patient had not vomited or complained of nausea during her stay in the hospital

A diagnosis of suppurative inguinal adenitis was made, and excision of the inflamed glands was decided upon A three-inch incision, parallel to Poupart's ligament, was made. There was exposed a mass of suppurating glands, several of which ruptured during the dissection As the dissection approached the saphenous opening, it became apparent that there was something more than a simple adentis to be dealt with Further search revealed the sac of a femoral herma containing gangrenous gut with a perforation When this sac was opened, a fæcal odor escaped A ligature was thrown about the strangulated gut and securely tied. A median abdominal incision was made and the gut with the ligature was drawn into the abdominal cavity Unfortu nately, the femoral canal was too small to transmit the ligated gut, and the ligature pulled off, permitting the escape of a small amount of fæcal matter into the peritoneal cavity. An examina tion of the involved gut proved it to be a part of the cæcum,the portion between the ileocæcal valve and the appendix, which was placed well to the outer side This fact accounts for the lack of symptoms of strangulation, as the fæcal circulation was not in the least interfered with

The opening in the execum was closed with Lembert sutures, the peritoneal cavity was flushed and the wound was closed without drainage. The femoral ring was closed with a purse-string suture, and the lower, or original, wound was closed with silkworm-gut sutures. A gauze drain was inserted, the end coming out at the lower end of the wound. The patient made an uninterrupted recovery

GANGRENE AND PERFORATION OF THE SMALL BOWEL FOLLOWING RADICAL OPERATION FOR DOUBLE INGUINAL HERNIA

DR Ross also reported the following case A man, aged fifty-seven years, had worked hard all his life, and used alcohol and tobacco in moderation He had enteric fever and influenza some years ago His general health appetite, bowels, etc., were in good condition He had double duret incomplete inguinal

hernia of fifteen years' standing; and while he said that this had caused very little pain, it had annoyed him so much that he had not been able to work for six months. The heart and lungs appeared to be normal, and an examination of the urine on several successive days showed nothing abnormal in either quantity or quality. He had an arcus senilis and some demonstrable sclerosis of the radials.

Radical operation was advised and accepted. Accordingly, both sides were repaired. It proved to be a double direct incomplete hernia, presenting no difficulty to correct. The sacs having a broad base were sewed instead of ligated. Neither the bowel nor the omentum was handled, as there was no necessity for so doing.

The day following the operation the patient complained of severe abdominal pain. He was very restless and had an anxious expression. The bowels moved and he expelled flatus frequently. On the two succeeding days his condition remained much the same. There were pain and restlessness, with intervals of quiet and sleep, the bowels moving and passing flatus. On the fourth day he had a bowel movement. He still complained of pain and was very restless. The abdomen was distended. On the fifth day his condition was about the same, except that the temperature rose to 103.2° F.; pulse, 36; respirations, 32. At 4.30 P.M. he expelled flatus, although the abdomen was still distended. He died of peritonitis at 5.35 P.M.

A partial post-mortem through the incisions was made, and the conditions found were as follows:

The incisions had both healed by first intention. The parietal peritoneum was not adherent to the bowel, either by inflammatory adhesion or by stitches. When the peritoneal cavity was opened, a greenish-yellow fluid, containing flakes of lymph, exuded; and the ileum was covered with irregular patches of greenish-yellow exudate, one metre from the ileocæcal valve. The ileum was gangrenous for about twenty-five centimetres, in the centre of which was a perforation four millimetres in diameter. The surrounding intestine was reddish-black. There was a considerable amount of exudate in the lower pelvis. The left kidney was normal. The right showed pale, cortical and medullary substance diminished in amount.

Owing to haste, the mesenteric vessels were not examined

carefully for a thrombus

Nevertheless, the reporter beheved that this was a case of clogging of the mesenteric arterial radicle of the involved bowel with thrombus due to arteriosclerosis

VESICAL CALCULUS WITH NUCLEUS OF CHEWING GUM

DR WILLIAM J TAYLOR exhibited the fragments of a calculus he had removed from the bladder of a boy of eighteen years. One year ago the boy had gonorrhoza, and, to prevent the discharge, had inserted into the pems several masses of chewing gum. These passed into the bladder and induced cystitis. The boy had drifted about under the care of quacks and homeopaths during the year, and calculi had formed upon the gum, four distinct masses of which were removed. Removal through a perineal incision was attempted, but the masses were too large, and a suprapubic operation was necessary. The masses were crumbled in their removal.

DR G G Ross cited the case of a man, the father of five children, who claimed the use of a catheter was necessary. He lost the catheter, and to replace it he moulded a piece of chewing gum around the end of a stick which he inserted through the urethra. It became dislodged by the body heat, and was located in the bladder by the cystoscope and removed through a suprapubic incision. The gum laid been in the bladder three weeks, and was found encrusted with salts.

and was round encrusted with saits

DR Horawrrz called attention to a somewhat similar case that he had reported some four years ago, in which 280 grains of white wax had been removed from the urinary bladder by means of a suprapuble cystotomy On admission to the hospital, the individual stated that the wax was in the bladder, but gave rise to no symptoms. Examination of the urine was negative. The mass was easily seen by means of the cystoscope. The wax had been inserted into the urethra, previous to intercourse, for the purpose of preventing pregnancy and slipped into the bladder whilst performing the sexual ret.

CORRESPONDENCE.

CORRIGENDA IN RE BONE TRANSFERENCE.

EDITOR ANNALS OF SURGERY:

In the February issue of the Annals I regret to find that in the "Report of a Case of Bone Transference," page 250, Figures 2 and 3 have been transposed. Fig. 2 as it now stands should read: "Fig. 3. Radiogram showing condition of bone thirteen months after operation." Fig. 3 should read: "Fig. 2. Radiogram showing condition eight months after operation." Will you be kind enough to make this correction in the next issue, as I believe the case is of sufficient importance to warrant an accurate chronological record?

THOS. W. HUNTINGTON.

Awarded

GOLD MEDAL

Louisiana

Purchase

Exposition

LISTERINE

Awarded

GDLD MEDAL

Louistana

Purchase

Exposition,

A non-toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution, sightly, pleasant, and sufficiently powerful for all purposes of asepsis these are advantages which Listerine embodies

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine.

LISTERINE DERMATIC SOAP

An antiseptic detergent for use in the antiseptic treatment of diseases of the skin.

Listerine "Dermatic" Soap contains the essential antiseptic constituents of eucalyptos (1%), mentha, gaultheria, and thyme (each ½%), which enter into the composition of the well known antiseptic preparation, Listerine, while the quality of excellence of the soap stock employed as the vehicle for this medication will be readily apparent when used upon the most delicate skin and upon the scalp. Listerine "Dermatic" Soap contains no animal fats, and none but the very best vegetable oils, after its manufacture, and before it is "milled" and pressed into cakes, a high percentage of an emollient oil is incorporated with the soap, and the smooth, elastic condition of the skin secured by using Listerine "Dermatic" Soap is largely due to the presence of this ingredient. Unusual care is exercised in the preparation of Listerine are "Dermatic" Soap, and as the antiseptic constituents of Listerine are "Dermatic" Soap, and as the antiseptic constituents of insepting emollient oil, they retain their peculiar antiseptic virtues and fragrance

Awarded
60LD MEDAL
Louisiana
Purchase
Exposition

A sample of Listerine Dermatic Soap may be had upon application to the Manufacturers—

Lambert Pharmacal Company, St. Louis, V. S. A.

Awarded

60L0 MEDAL

Louisiana
Purchase
Exposition

Cattell

First edition exhausted in six months Second revised and enlarged edition

Just Issued

Post-Mortem Pathology

By HENRY W. CATTELL, A.M., M.D.

Sometime Director of the Josephine M. Ayer Clinical Laboratory of the Pennsylvania Hospital; Pathologist to the Philadelphia Hospital; Senior Coroner's Physician of Philadelphia; Pathologist to the Presbyterian Hospital; Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania.

Octavo. 464 pages. 183 illustrations. Cloth, \$3.00.

R. CATTELL, whose name is already well known to our readers as one of the editors of the English translation of Ziegler's work on General and Special Pathology, has in 'Post-Mortem Pathology' written an excellent guide to the proper carrying out of post-mortem examina-This volume will prove to be a most useful reference book on matters eonnected with every branch of the subject; where description fails to convey the meaning of some manipulations, excellent illustrations make matters quite There is no doubt that many practitioners feel the want of some such aid, for in the past we fear our own curriculum of medical education has been defective in not insisting upon closer attention to such matters. To English as well as American readers this volume will be of service in this direction, and considerable help will be found in the ehapter dealing with difficult questions of medicolegal character. Dr. Cattell's great experience in pathological inquiries gives him the right to produce a work of this kind, and, as might be surmised, there is little room for criticism of the statements made, though the reader may disagree with some of the methods recommended—as, per example, the method of opening the skull—such differences are of minor importance. After discussing the choice of instruments and the design of post-mortem rooms and refrigerator apparatus, the account is given of the various pathological appearances met with in various systems in different diseases. Special guidance will be found for the examination of children, and for what are called restricted post-mortem examinations.

"Harkes's method for securing a view of the nasopharnyx by median section of the skull after the calvarium has been removed is described, and a useful account is given of the methods to be adopted for preserving bodies for subsequent examinations and embalming. Amongst other general information will be found an account of the methods to be adopted to fix permanently the colors of the tissues in museum specimens (Kaiserling), of the early diagnosis of rabies by the method—elaborated by Babes, Van Gehuchten, and Nelis, and of Uhlenhuth's precipitin test for human blood. The volume closes with a useful analysis of the various modes of death which occur in different diseases."—
British Medical Journal, October 15, 1904.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our netw Catalogue is well worth having-sent on request

Spalteholz and Barker Just Issued

Atlas of Human Anatomy

By WERNER SPALTEHOLZ

Extraordinary Professor of Anatomy in the Le versity and Custod an of the Anatom cal Museum at Le pz g

EDITEI AND TRANSLATED FROM THE THIRD CERMAN POITION
BY LEW ELLA'S F BARKLER WB, Tor
Professor of Anatomy University of Chicago
With a prepare

By FPANKLIN P MALL
Professor of Anatomy the Johns Hopkins University Balt more

Square Octavo 872 pages 935 illustrations mostly in colors 3 volumes Cloth \$10.00 per set

OR convenience this atlas is divided into three volumes

VOL I -BONES JOINTS LIGAMENTS

VOL II - REGIONS MUSCLES FASCIÆ HEART BLOOD VESSELS

VOL III -VISCERA BRAIN NERVES SENSE ORGANS

Pictures of dissections true to nature aid the imagination refresh the memory and act as an excellent guide in the practical worl of the physician and surgeon. In this this the illustrations are typical and give all the 64% es of a dissection of a body from its beginning to its completion.

This work is intended to embrace the entire descriptive anatomy with the exception of histology and is his wife to have due regard for the field which has

between microscopic and macroscopic anatomy proper

The topographic relations of the organs and especially of the vess is an increes have been given the utmost consideration obtains it within the compress of a book which treats primarily of descriptive anatomy. When objects have appeared difficult from a teaching standpoint many drawings were made from every possible view point.

The text gives a clear description of the figure and it is much more detailed than is really neces ary in a nathes in which it or illustrations are the essential jet it resembles many text bools in completeness. For showing the soft parts

the material was all carefully hardened in formalin

Notwithstanding the enormous cost of production the price has been I ept down to a figure that places this samptious word within the reach of every pretitioner and student. The majority of the illustrations are from original drawings by the well-known anatomical artist. Bruno Herony

The book speaks for itself must be seen to be appreciated and when once seen, will be universally highed as one of the finest anatomical attress ever placed upon the mart et

J. B. Lippincott Co. Philadelphia since 1792

Our new Catalogue is well worth having-sent on request

SECOND EDITION.

The Diseases of Society

(The Vice and Crime Problem)

By G. FRANK LYDSTON, M.D.

Illustrated.

870

Cloth, \$3.00, net.

Postage, 17 cents extra.

THE most direct, forceful, and out-spoken study of social conditions in this country which has yet been put into print. Dr. Lydston considers not only the police criminal, the anarchist, and the sexual pervert, but also that vast number of offenders against the moral and physical laws whom the law cannot reach. He deals with the oppression of wealth, the rights of organized capital and labor, the negro question and the crimes which have grown out of it, and with the crimes of "society" at large.

'Most books of the kind have been written by strongly idealistic reformers. Here we have one written by one of the most eminent physicialis not only of this country, but the world, who has given long years of study to the questions at issue; one whose apprenticeship began as one of the surgeons, in fact, resident surgeon, to the penal institutions at Blackwell's Island, and who has ever since been intimately connected with every phase of life treated of in the book in question "—Boston Transcript.

"All the standards of false modesty are swept away with relentless hand by this student of affairs as they are instead of as they ought to be, and the reader needs must learn much that he would prefer to avoid Still the method of handling is that of the surgeon who must probe the wound before he can heal it, and it is always evident that the consideration of abnormal conditions is only for sake of teaching both prevention and cure "—San Francisco Bulletin

CONTENTS

CHAPTER

- I. Social Pathology.
- II. The Principles of Evolution in their Relations to Criminal Sociology and Anthropology, and to Social Diseases in General.
- III. The Etiology of Social Diseases in General, with Especial Reference to Crime.
- IV. Neuroses in their Relations to Social Diseases—
 Brain Development—Insanity—The Criminal Skull—Epilepsy—Hysteria—Suicide.
 V. The Chemistry of Social Diseases—Toxemia
 - V. The Chemistry of Social Diseases—Toxemia in its Relations to Vice and Crime—Alcoholism, Narcotic Inebriety, and Auto-Intoxication.
- VI. Anarchy in Relation to Crime.

CHAP

- VII. Sexual Vice and Crime.
- VIII. Sexual Vice and Crime (continued) Satyriasis and Nymphomania—Sexual Psychopathy.
- IX. The Race Problem in its Relation to Sexual Vice and Crime.
 - X. The Treatment of Sexual Vice and Crime.
- XI. Genius and Degeneracy.
- XII. Physical and Psychic Characteristics of the Criminal.
- XIII. Illustrative Crania and Physiognomies of Degenerates.
- XIV. The Therapeutics of Social Disease in General, with Especial Reference to Crime.

*

PUBLISHED BY

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

To Physicians and Surgeons:

WE have just issued a new and revised Catalogue of our Medical and Surgical Publications, which we will be pleased to forward free of expense to all physicians and surgeons requesting same. As a guide to the latest and most approved books on Medical and Surgical Science, it will be found of especial interest and value to all members of the profession.

J. B. LIPPINCOTT COMPANY

The MIDLAND ROUTE



BETWEEN -

Denver, Cripple Creek,

Leadville, Glenwood,

and Salt Lake City is

THE PEER OF SCENIC ROADS

BEST EQUIPMENT—FINEST ROADBED

P S —Send for illustrated booklet on Colorado as a health and pleasure resort to

C H SPEERS, Gen Pai: Act., DEVIER

66 How any practitioner of medicine can satisfy himself to practice medicine or surgery in these days of great and rapid discoveries and important clinical suggestions without keeping himself informed as to the contents of such a book as that now before us is incomprehensible. There are none of us "that knows it all;" and the doctor makes himself ridiculous who affirms that he has not time to read. This volume of the International Clinics is very valuable. -containing new articles, practical suggestions, and pointing out useful lessons in the description of diseases, their diagnosis, treatment, etc.,-medical, surgical, gynecological, neurological, etc. Our space is too limited for a statement of the contents in detail, but an excellent index of the volume, as also an index of the Fourteenth Series. completed with this volume, are appended The Virginia Medical Semi-Monthly, February 10, 1905.

THE PRICE IS \$2.00

Full descriptive pamphlet and illustrated catalogue sent free on request.

J. B. Lippincott Company

LONDON since 1872

PHILADELPHIA since 1792

Bureau of Health Chemists Endorses Bailey's Pure Whiskey

To the testimony of some of the best known physicians of demand following



I have to cd five quarts of whiskey labelled. Balteys Ryw hakey baisen a sea die to test by merfrom the stock exposed for sale at your store 100 Market S est by a r d flerent methods includ as three well known none (the VI) get the Resco (no) and the were negative. In other words 1 found these whisk es to be free from adultered on and all flore ga and spurposs after interest.

SPECIAL OFFER TO PHYSICIANS AND NURSES

In order to g ve profess onal pract tioners the opportunity of

only to phys c ans and nurses for home or profess onal use Write for copies of analysis etc

HUEY & CHRIST

1209 Market Street

PHILADELPHIA

cobinson

SALESMAN WANTED

ANNALS OF SURGERY

\$5 00 a year

A monthly re ew of surgical science and practice now in its forty first volume recognized as the author tauve exponent of the best ork of English speaking surgeons

WANTS

SALESMAN

The Annals 5 of great alue to every Doctor whether engaged in a surgical work or regular precede only. Each unaber coats as 160 pages fully illustrated—org nat mater all being an exh tot of the work done by the most accomplished surgicins of the best hosp tal of the large et es. Vecessary to every Doctor

GOOD OPPORTUNITY FOR RIGHT MAN TO EARN BIG MONEY 11BERAL COMMISSION Addres

ANNALS OF SURGERY

227 S 6th St, Philadelphia



Dr W keen M D LL D F R C S (Hon)
Profesor of the Pr clyles of Surgery and of Clinical
S nerv deferson Med cal folloge Ph ladelphia
This ne v photo-etching from 1 to i. a real triumpl

Impress ons the graved title \$5.00 Sent by ma I in slout tube upon receipt of price

ROBERT M. LINDSAY, PUBLISHER
11th and Walnut Streets, Philadelphia

When writing please mention ANALS or SURGERY

23

STEARNS' ANTITOXIN

Why it is Popular

WE do not claim that our diphtheritic antitoxin is the only good product of its kind on the market, for undoubtedly the standard of quality in most 'American serums is high.

It is significant, however, that most of the users of our antitoxin formerly used the product of other makers (who were in business before we took up this line) and thus give the Stearns brand a logical preference. We believe no other brand is more widely or more favorably known.

The majority of physicians who have expressed themselves to us say they consider our serum better than any other: and nearly all the rest explain their preference by saying that they find our "Simplex" syringe the most convenient and satisfactory, while at the same time our serum has no superior.

Either of these two reasons is weighty. If you have not yet tried Stearns' Diphtheritic Antitoxin we request that you do so at the first opportunity. The result will show why Stearns' serum has so many friends, though on the market but six years. No better serum can be made than is produced in our \$100,000 biologic department—while the superior convenience, strength, and safety of our syringe are evident at a glance.



WINDSOR,ONT-LONDON, ENG.-NEW YORK.CITY.



St. Winifred's Hospital,

SAN FRANCISCO, CALIFORNIA

A New FIRE-PROOF Hospital

with Fifty Sunny Rooms Centrally located The most Modern Operating Rooms in the West. A Private Sana tomum for Medical and Surgical Cases WINSLOW ANDERSON M D MRC P Lond etc. Madical Director

DON'T WAIT

until your health is gone, but go now to

EUREKA SPRINGS, ARK.

A week or two of the dry, pure, pine-laden mountain air and the cool, clerr, curitive water will make you feel like a new man, and its so convenient

ONE NIGHT FROM ST. LOUIS



PERRY GRIFFIN 111 South Minth Street Philadelphia, Pa.

HAL S RAY & E P A 401 BROADWAY NEW YORK

THE POMEROY FRAME TRUSS-For HERNIA



Our Specialty is the fitting of trusses by the Frame method

We guarantee, with this truss, to retain securely and comfortably the hernia of any person referred to us

Difficult cases that have been considered unholdable, are especially solicited. We have such coming to us from all parts of the country, and invariably give them complete satisfaction.

POMEROY COMPANY-NEW YORK

TWO OFFICES

With competent attendants in charge 17 UNION SQUARE, NEW YORK

414 FULTON ST., BROOKLYN

POMEROY COMPANY—NEW YORK

THE POMEROY FRAME TRUSS-For HERNIA

AMBULATORY PNEUMATIC SPLINT.

Prof. Ochsuer says, "If the . . . fracture is in the lower extremity, it is wise to apply an ambulatory splint, so that the patient will be enabled to walk upon the extremity, within a few days after the fracture has been adjusted. It seems that better results can be obtained this way than where the patient is required to lie quiet for a number of weeks."

The Ambulatory Pneumatic Splint fulfils all of the surgical principles and practical mechanical points pertaining to the accurate reduction and treatment of all fractures and dislocations of the lower limbs, and for cases of non-union, knee and hip-joint diseases. The use of this appliance permits the treatment of patients in the recumbent or ambulatory positions. The splint enables the surgeon to give his patients the benefits of exercise, sunlight and fresh air, thereby stimulating function of the system and keeping all organs normal, so essential in the treatment of many patients.

On account of the superior care given with this appliance, good bone union is invariably

secured, with little if any shortening or deformity. Any surgeon that has to deal with above class of cases, should write for full information, advertisement of which appears elsewhere.

Dr. Marcy, Surgeon, Peoria, III., says that: "I find the Ambulatory Pneumatic Splint in every way satisfactory and that it is well worth its price every time it is used."

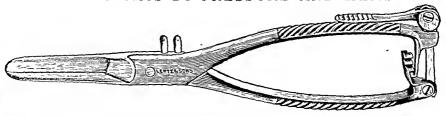
ISCHIO-RECTAL ABSCESSES.

After incising the abscess irrigate thoroughly and clean up with a Sulpho-Napthol solution, strength one teaspoonful to a quart of warm water. Insert a wick wet with the Sulpho-Napthol solution. Then apply a large compress, using a solution of the same strength and continue the treatment till recovery is complete. This method of procedure will be found agreeable to the patient and physician, as it is comfortable and will do away with the foul odors so often attending these conditions.

Surgery Without Ligatures

DOWNES' ELECTRO-THERMIC ANGIOTRIBE

HÆMOSTASIS BY PRESSURE AND HEAT



Four Styles of Forceps, three straight blades, ¼, ¾, and ½ inch wide, and curved blade ¾ inch wide.

Over 600 major abdominal operations performed without secondary nemorrhage.

Forty leading American surgeons are now using them. Write for reprints and circulars,

CHARLES LENTZ & SONS

Manufacturers of Surgical Instruments

18 and 20 North Eleventh St.

Philadelphia



A CASE OF PNEUMONIA FOLLOWING SEVERE TYPHOID -RECOVERY

From a Correspondent in Florida

J B W -- White, male, age 30 years, was recovering from a severe case of typhoid On the 36th day his temperature was normal On the 39th day it again began to rise and in a few days had reached 1045, the pulse 140 A severe cough and consolidation of the right lung told the story of a complicating pneumonia. After the long and severe drain upon his resources incident to the typhoid his condition presented a very alarming, not to say desperate situation

Counsel was called and it was decided that his only hope lay in the generous use of Antiphiogistine A "Large" package was secured and herted by placing the sealed can in hot water The temperature of the room was brought up to about 80° A cotton lined cheese-cloth jacket open upon the shoulders and in front, was prepared and warmed Uncovering the patient's thorax, Antiphlogistine as hot as could be borne was spread upon the skin about } inch thick over as much of the thoracic walls as could be reached (back, front, side, and over the shoulder This was covered with the jacket Turning the patient over, the other side was dressed in the same way jacket was then drawn together over the shoulders and down the front with stont thread It is proper to say the entire con tents of the 34 4 oz package (Large) was used for the one dressing

The effect was surprisingly prompt. In a few hours the temperature had declined to a point of safety and the pulse to 120 A similar dressing was applied fresh every 24 hours The improvement was steady and marked and in six days the patient was agun convalescent, thanks to Antiphlogistine

NO MORE POULTICING IN THE TY S ARMV

"In a recent notification by the Surgeon General of the U S Army, it is ascerted that all the good results from poultices can be obtuned in a more cleanly way by the use of wet hot compresses Hence the order to the army surgeons to drop linseed and linseed meal from army medical requisitions '-Virginia Medical Semi Monthly

We highly approve of this order as far as discarding poultices made of putrescible and hacteria breeding materials is concerned, for that is what has been done by all up to-date physicians in private practice, but we can hardly recommend the substitute offered We supposed that every one in this enlight ened age was using Antiphlogistine in all such cases because of its advantages over everything else in permanency, efficiency, and cleanliness Compare Antiphlogistine, renewed but once a day, with hot compresses renewed every twenty minutes, and we cannot imagine any one using compresses when Antiphlogistine is available



FREE Catalogue H. THE 20TH CENTURY POLYCLINIC CHAIR Manufactured by THE PERFECTION CHAIRCO.

INDIANAPOLIS, IND.

ARTIFICIAL LEG Our Art Catalog contains valuable informa-tion on Care and freatment of Stump Prepara-tory to explying an Art Limb Haw Soon to Apply Art Limb for Children Directions for Bell Measurement, etc. etc.

GEORGE R FULLER CO , ROCHERTER, N

SAL HEPATICA.

Effervescent arce acid solvent and eliminator stimulates fiver tones all intestinal glands pu rifies alimentary tract and improves digestion, assimilation and metabolism It is practically specific in rheumatism, out and billous attacks Sal Hepatica has no equal for eliminsting toxic products from in testinal tract or blond and correcting vicinus clogged functions Write for free sample

BRISTOL MYERS CO . Brooklyn. New York





"Rest and Change of Scene."

"Sign of the Best"

Follow your own prescription. Take a vacation. Join the physicians who will go West to the Portland Exposition this summer over the Northern Pacific Railway, the official route designated by the Transportation Committee.

Wonderful country, the Great Northwest. Rich in scenery, endless in pleasure-opportunities, a land of romance and greatness in the making.

A double opportunity. The wonderful Yellowstone Park en route at small additional cost; the Lewis and Clark Exposition at the journey's end.

Three Solid Special Trains For Convention Delegates

- "Medical Journal Special" leaving Chicago June 30, St. Paul July 1. Stops en route for a comprehensive tour of Yellowstone Park, "America's Wonderland." An interval of rare pleasures.
- "Second Medical Journal Special" leaving Chicago July 1, St. Paul July 2, stopping en route for a tour of Yellowstone Park.
- "Medical Society Special" leaving Chicago July 6, St. Paul July 7, with sight-seeing stops at important cities en route to Portland.

Travel Comfortably.

Northern Pacific Railway

"Every Mile an Education"

Ask for information which will enable you to travel on one of the special trains "Wonderland 1905" for 6 cents, "Lewis and Clark Booklet" for 4 cents.—A. M. CLELAND, Gen'l Pass. Agt., St. Paul. Rates, dates, itineraries from

P. W. PENNEWILL, D.P.A.,

711 Chestnut Street, Philadelphia.

STOVAINE

storame is a synthetic chemical product obtained from certum anno alcohol and posee sing marked analgesic qualities that strongly recommend it for use in the field of local annesthesia, both jungical and dental Compired with occume it is very mark less toxic while its uniquest properties are greater. It possesses the further good quality of not inducing mauser. It has a transitory viso-dilatory action on the blood vessels enabling the surgeon to perform many operations upon patients in a sitting posture which were formerly necessary to perform in a recumbent position. The action on the heart is that of a tonic.

Rolutions of Stovaine are permanent and can be sternlised in Nemperatures as high vo-240° F without fear of decomposition which is a property of decided advantage. The bacterioidal victis in of Stovaine is marked and this feature is such as to war iant close attention from the operating surgeon. All things considered Stovaine marks an epoch in the annals of local mass them and is destined to occupy a field not heretofore filled by any other known sub-stance used for this purpose. Goldbeck's

Malt Extract

The result of a life time of study of the proper combination of ingred ents Smooth to the tuste and rich in the desired nutritive qualities, amoung the clusive appetite and imparting a real zest to life A med cine of unfailing efficacy, devoid of any unpleasan associations.

Prescribe · Goldbeck's" and watch results They will please you

Especially adopted to the needs of Nursing Mothers

JOHN F BETZ & SON, L mited

Crown and Callowhill Streets PHILAPELPHIA, PA.

The Medical Department of the UNIVERSITY OF THE SOUTH

A College Association Graded Graduating Summer School of Medicine, situated on the Cum berland Plateau at Sewance Tennessee 2000 feet above 952 level will open its thirteenth course of lecture on April 1 1903 and close the succeeding October.

For courses of lectures will be required before graduation with legal intervals when four

actities adequate laboratory and medical knowledge at reasonable

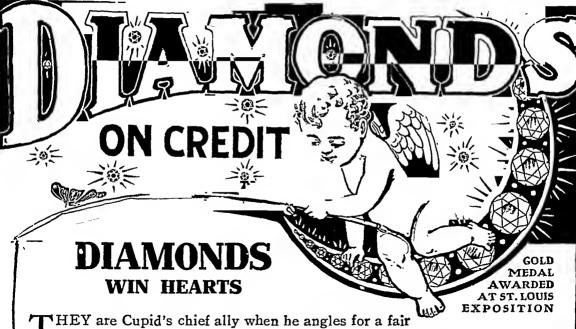
J S CAIN, M D, Dean, Sewanee, Tenn

Dry Secretions.

Respiton COMPELS the ELIMINATING organs to no their normal duty, hence the remedy for Fevers, Colds, Bronchitis, Pneumoula and all Pathological Conditions with dry skin and dry secretions

Respiton represents the medical properties of Ascieplas and Berberls. Dose, teaspoonful every two or three hours, or less often, as Indicated.

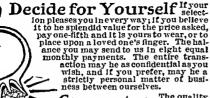
Dad Chemical Company, . . New York and Paris



THEY are Cupid's chief ally when he angles for a fair one's heart. On a woman's finger, a sparkling solitaire bespeaks and reflects some man's enduring regard and affection. Worn by a man, a Diamond bespeaks prosperity; in fact helps to gain it, and renders literally true the saying—"To be successful, look successful."

You Can Wear Or Give A Diamond

Your First Step Isto write for our beautifully every page of which is laden with reproductions of the latest and most artistic Diamond pieces, watches and jewels. Your first impression will he of a bewildering variety of the finest goods at most reasonable and attractive prices.



Guarantee The quality of anything sent you is absolutely guaranteed. No Diamond leaves our establishment without a signature attached is the one of greatest responsibility in the Diamond and Jewelry trade.

Money Back Offer While our business involves very largely the extension of credit contrelles to distant buyers, we of course sell for cash as well, and it is in conne

a to pt cost of cents per week.

Advantages Offered There are certages offered by our house that are clearly beyond the reach of small concerns. We are for instance, the largest retailers of Diamonds in the world, and the only Diamond Cutters in the world offering their product at retail. The offert are very similar in the price in antages which we can offer a reagainst the frequency of instances which we can offer a reagainst the frequency of instances which we can offer a reagainst the frequency of instances which we can offer a reagainst the frequency of th

Our Credit Offer is open to any ing capacity and honest intentions in the United States. The account of the small salaried employee for anything within reasonable requirements, is just as welcome on our books, as is that of his or her well-to-do employer. The Loftis System is universal in its scope and application. It is open to every honest man and woman.

Please write today for Catalogue and Souvenir Booklet.

Loftis Bros. & Co. (Est.)

PIAMONDS-WATCHES-JEWELRY

Dept. C 274 92 to 98 State Street, Chicago, III.

SURGICAL CLINICS

"In a paper entitled 'Surgical Chines,' Dr. Frederick Holme Wiggin, Visiting Sur geon, City Hospital Visiting Gynecologist, St. Llizabeth's Hospital, Consulting Surgeon, Metropolitan Throat Hospital New York, details the technique of an appendi citis operation. After enturing the wound and disinfecting the skin he applies the fol lowing solution Celloidin 1 part absolute ether 4 parts alcohol 4 parts thoroughly seals the wound but permits of its complete inspection, as the celloidin is transparent. The dressing also acts as a splint and holds the edges of the wound in proper position If properly applied, it pre vents infection of the wound and tisques from displacement of the handage or careless This is a great advantage es handling pecially when the surgeon is obliged after the operation to leave the pitient during convalescence to the care of others

"The preparation was first called to his attention by Mr. E. Stanmore Bishop of Man. chester. England It must not be applied too liberally as it liss strong contractile powers, and if too large a surface is covered it is likely to contract sufficiently to cause the edges of the wound to turn musrd. The solution should be made fresh for each opera tion as ether and absolute alcohol evaporate ripidly Care must be exercised to see that the ckin is well dried and the wound is not oozing or the solution will not adhere prop A piece of gauze is placed over the dressing and held in place with adhesive strips lightly applied, so as to make no pres sure Il alter lour or five days there are no signs of infection, this can be removed When properly applied, the celloidin will adhere for eleven or twelve days but if there is an infection it will be found loose and can be removed like an old scab

"Ir Wiggin has used this dressing for five or six years and has found it very satisfactory and a great aid in his surgical work."

Abstracted from the International Journal of Surgery, Vav. 1904 (Vol. 17, No. 5, p. 153)

More Important Facts

II

OF PRICESOR

q With n the last two months seventy samples of witch hazel were purchased from a many wholerale and retail dealers in the commercial article in six of the largest cuttes of the United State on scrupulous investigation by the most reputable analytical chemist of the country, flyt-two of these samples showed wood alcohol or formaldehide or both

In the face of such permicious conditions, it must be obvious that, in all cases in which hammels is indicated, only a standardized product of invariable punty, quality, and strength-like POND: EXTRACT of Hamamels—may safely be prescribed and used.

LOW EXCURSION RATES TO NEW ORLEANS, LA, MOBILE, ALA, AND PENSACOLA, FLA

On account of the annual Mardi Gras the Seaboard Air Line Railway will sell tickets from Washington and other points to New Orleans Mobile and Pensacola at the extremely low rates of one first-class fare plus twenty five cents for the round trip. Tickets will be sold March 1st to 6th inclusive with final limit to leave on return trip March 11th. By depositing tickets with Special 1905 Agent not later than 501 r w, March 11th. and upon payment of fee of filts cents, an extension of final limit to permit of departure for return tourney up to and including March 25th will be granted Write for information regarding low rates from points North of Washington

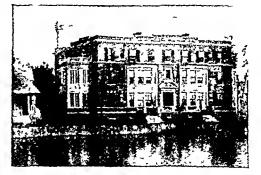
The Serboard Air Line Railway is the shortest and quickest route to Florida Three truns daily with Pullman and Dionig Cur service, including the famous Seaboard Florida Limited, a solid Pullman frain through from New York to Jackson ville and St Augustine Fla, without change Addries J J Puller, District Passenger Agent, No 1411 Chestont St. Pulladelphin, Pa.

WHERE TRUE QUALITY IS SHOWN.

The excellence of Scott's Emulsion is recognized by the highest authority. The London Lancet said of it: "The value of the hypophosphites combined with cod liver oil, especially in wasting diseases and debilitated conditions, is well known. addition to these constituents, Scott's Emulsion also contains glycerine, which is well recognized as assisting vel materially in the absorption of oils and fats. We have examined the preparation with care, and find that it fulfils all the requirements and presents all the conditions of a very satisfactory emulsion. In appearance and consistence it is not unlike cream, and under the microscope the fat globules are seen to be of perfectly regular size and uniformly distributed. In fact, the preparation, microscopically examined, presents the appearance of cream. So well has the oil been emulsified that even when shaken with water the fat is slow to separate, the liquid then looking like milk. The taste is decidedly unobjectionable and is pleasantly aromatic and saline. We had no difficulty in recognizing the presence of the hypophosphites in an unimpaired state. The Emulsion keeps well even when exposed to wide change of tem-Under the circumstances just described the Emulsion should prove an excellent food as well as a tonic."

PROTECTION IS WHAT THE DOCTOR WANTS.

The old and reliable Fidelity & Casualty Co., of New York, with agencies in all cities, are doing a large business in the way of insuring physicians and surgeons against both trouble and loss from alleged malpractice suits by mischievous adventurers. Physicians who take out a policy with this company are not disappointed with the treatment received, and have the full assurance that they will be protected to the utmost in every particular. This is quite in contrast with the methods of several of the so-called "Defense" Companies, who only agree to defend such litigation, and in the event of damages being obtained, as is too often the case, the confiding physician has to pay the bill himself. It is well for the medical profession to look into these points carefully and see just what kind of a policy and proposition they are paving for.



SARAH LEIGH HOSPITAL Norfolk, VA.

A new, thoroughly up-to date private hospital. Rooms single or *en suite*. Private Baths. Quiet surroundings. Salubrious Climate. Especially for Surgical, Gynecological and Rest Cure Cases. A few Medical cases taken.

Correspondence with physicians invited.

Address one of the following:

DR. SOUTHGATE LEIGH, SUBGEON IN CHARGE DR. STANLEY H. GRAVES, ASSOCIATE, MISS M. A. NEWTON, SUPERINTENDENT.

PEROXIDE SOLUTIONS IN OTOLOGI-CAL PRACTICE.

"Bruder (Revue Hebdomadaire de Laryngologie), calls attention to the unpleasant results which have followed the careless use of peroxide solutions, or those of inferior and unreliable grade in otological practice, such as diffuse external otitis, cerebral symptoms, suppurative phlebitis in the lateral sinus, etc. In one case fatal cerebellar meningitis followed the use of impure peroxide. The meatus should be smeared with vaseline before any form of peroxide is used, and if unpleasant symptoms follow the peroxide should be discontinued. In case of cholesteatoma, especially in operations on the mastoid, with sinus phlebitis and extradural abscess, the remedy should be used with great caution. With these restrictions, the remedy can be profitably employed. The great point for consideration is the purity of the product, and ample evidence has shown that there are very few suitable peroxides on the American market. Dioxogen has the advantage of absolute purity with stability found, probably, in no other peroxide, and, in otological practice, its use has been found not only efficient but absolutely safe. '-From The Chicago Clinic and Pure Water Journal, Jun., 1905.

IN THE TREATMENT OF

www

ANÆMIA, NEURASTHENIA, BRONCHITIS, INFLUENZA, PULMONARY TUBERCU-LOSIS, AND WASTING DISEASES OF CHILDHOOD, AND DURING CONVALESCENCE FROM EXHAUSTING DISEASES.

THE PHYSICIAN OF MANY YEARS' EXPERIENCE

KNOWS THAT, TO OBTAIN IMMEDIATE RESULTS. THERE IS NO REMEOY THAT POSSESSES THE POWER TO ALTER DISORDERED FUNCTIONS, LIKE

"Follows Surup of Hupophosphites"

MANY A TEXT-BOOK ON RESPIRATORY DISEASES SPECIFICALLY.
MENTIONS THIS PREPARATION AS BEING OF STERLING WORTH.

TRY IT, AND PROVE THESE FACTS.

NOTICE.-CAUTION.

THE success of Fellows' Syrup of Hypophosphites has tempted certain persons to offer imitations of it for sele. Mr. Fellows, who has examined samples of several of these imitations, finds that no two of them are identical, and that all of them differ from the original in composition, in freedom from acid reaction, in susceptibility to the effects of oxygen when exposed to light or heet, in the property of retaining the strychial in solution and in the medicinal effects.

As these chesp and inefficient substitutes are frequently dispensed instead of the original, physiciens are carnestly requested whon prescribing the Syrup, to write "Syr Hypophos. FELLOWS"

SPECIAL NOTE -Fellows' Syrup is never sold in bulk, but is dispensed in bottles containing 15 or.

MEDICAL LETTERS MAY BE ADDRESSED TO

MR. FELLOWS, 26 CHRISTOPHER STREET, NEW YORK.

ANASARCIN

RELIEVES

Valvular Heart Trouble

by reducing number of heart beats, giving the heart rest, increasing the force of the Systole, causing valves to close more thoroughly, thus preventing regurgitation, relieving the dyspnæa and increasing heart nutrition.

Cirrhosis of the Liver

by equalizing the circulation, dilating the arterioles, thus relieving obstruction in the branches of the hepatic artery and portal radicles, securing better circulation in the liver and more nutrition to the cells and interlobular connective tissue.

Ascites and Anasarca

by causing resorption of the effused serum into the circulation, whence it is easily eliminated with salines.

Exophthalmic Goitre

by its inhibitory power over the cardiac fibres of the pneumogastric, controlling the heart's action indefinitely without detriment, thus preventing enlargement, or restoring to normal if already enlarged, the thyroid arteries and the vessels behind the globes which cause prominence of the eyeballs a d enlargement of the thyroid gland, both of which are consecutive to the cardiac disorder.

Bright's Disease

by its power to relieve distal engorgements through its wonderful equalizing effect on the circulation, dilating the arterioles and establishing a normal physiological balance between arterial and venous systems.

Sample and Literature to Physicians

Address

THE ANASARCIN CHEMICAL CO.

WINCHESTER, TENN., U. S. A.

Messrs. THOS. CHRISTY & CO., London Agents

He Has Two Good Legs

One made by NATURE, the other by MARKS READ WHAT HE SAYS





I am. respectfully yours FRANK FAUST Pousville, Pe

This demonstrates that a man may lose a leg in an accident and yet fire a locomotive. A treatise and messuring sheet, sent gratis Address

MARKS, 701 Broadway, New York Received the only Grand Prize for Artificial Limbs at the World's Fair, St. Louis



DR. BROUGHTON'S

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to R. BROUGHTON, M.D.

ROCKFORD, ILL

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators,

See that the name R. L. POLK & CO. IS ON THE OROER BEFORE YOU SIGN IT.

POLK'S is the only complete Medical Directory FOLK'S is the only Medical Directory having an index to all physicians in the United States. OLK'S has stood the crucial test of time with

SUBSCRIBE NOW.

When writing, please mention Avvals or Surgery

The advent of the season in which

COUGH, BRONCHITIS, ASTHMA, WHOOPING COUGH, Etc.

Impose a tax upon the resources of every physician renders it opportune to re-invite attention to the fact that the remedy which invariably effects the immediate relief of these disturbances, the remedy which unbiased observers assert affords the most rational means of treatment, the remedy which bears with distinction the most exacting comparisons, the remedy which occupies the most exalted position in the esteem of discriminating therapeutists is

GLYCO-HEROIN (Smith)

GLYCO-HEROIN (Smith) is conspicuously valuable in the treatment of l'neumonia, Phthisis, and Chronic Affections of the Lungs, for the reason that it is more prompt and decided in effect than either codeine or morphine, and its prolonged use neither leaves undesirable after-effects nor begets the drug habit. It acts as a reparative in an unsurpassable manner.

DOSE.—The adult dose is one teaspoonful, repeated every two hours, or at longer intervals, as the case may require

may require
To children of 10 or more years, give from a quarter to
a half teaspoonful
To children of three or more years, give five to ten drops

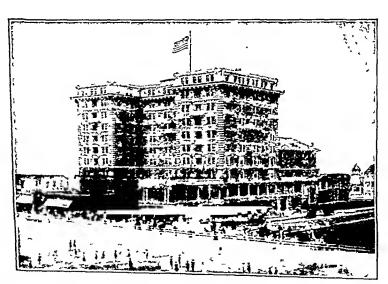
MARTIN H. SMITH CO. PROPRIETORS,

New York, N. Y.

Samples supplied, carriage paid, upon request.

CHALFONTE

ATLANTIC CITY, NEW JERSEY



This new Fireproof Structure was opened July 2, 1904, after the expenditure of over \$600,000.00 for improvements.

Special provision has been made in it for those seeking rest and recuperation at the seashore. It is different in many respects from other resort houses, but especially so in the increased amount of space devoted to the public and the variety and excellence of the table.

The patronage and favorable influence of the Medical Profession is solicited.

CHALFONTE T H

THE LEEDS COMPANY

ON THE BEACH Atlantic City, N. J

When writing, please mention Annals or Surgery.

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic.

Antiseptic and Styptic. The application of Orthoform to wounds of whatever character relieves pain for hours, frequently days. Also itching and pain of Pruritis. Eczema, Laryngeal Tuberculosis, Otitis. Conjunctivitis, etc.

Used as sprinkling Powder, Insufflation, Emulsion or Ointment.

Literature on application to

VICTOR KOECHL @ CO.



People have no idea how much injury the wrong kind of underwear may do them It may keep them warm, but how about rendering the skin all tender, sensitive, bloodless, and covered with unabsorbed perspiration?

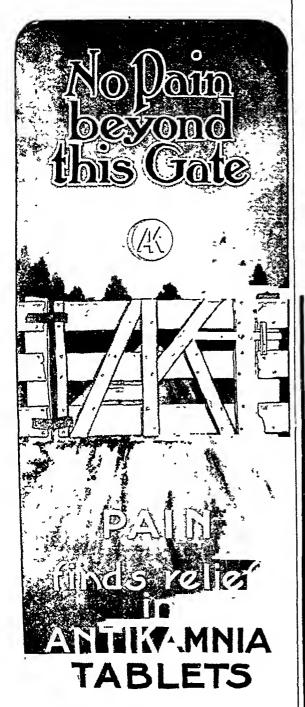
The Dr Deimel underwear keeps the skin nice, sweet, clean, and dry, and insures an active skin and a vigorous body

All Dr Deimel Garments bear the Dr Delmel name For sale at best Dealers everywhere For Booklet Samples and Full Information Address

THE DEIMEL LINEN-MESH COMPANY 491 BROADWAY, NEW YORK

CAN FRANCICO MASHINGTON BROOKLAN BULTIMOPE WONTREAL III Nonigomery CL 1111 Nonigomery CL 1125 81 NI SIO Pulmor ST 110 N Letington St 220° St. Catherine St. LONDON N C Ing. Ki Strand (Hotel Ceil)

Dr Heimel Linen Wesh Supporters Suspensories etc. are made and sold exclusively by J. ELLWOOD LEE CO., Conshahocken, Pa.



DO NOT DEPRESS THE HEART DO NOT PRODUCE HABIT APP ACCURATE-SAFE SUPP

LE VIEW ANDIN (JEWILLY CONC.

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in confort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18 x 34, 27 x 40, 36 x 76, 42 x 76, 54 x 76.

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

SCHERING'S

Exodin

Tasteless and odorless cathartic,
unique in promptness, reliability,
pleasantness and harmlessness.

Duo - Glycero-phosphates (1:1), convenient

for dispensing and administration.

Urotropin Effects a urinary antisepsis that was wholly unattainable before its introduction by Prof. Nicolaier.

Renders infections shorter and

Formalin

Lamp

Invaluable in all zymotic diseases.

Literature on request.

SCHERING & GLATZ, New York.

CHICAGO

ROENTGEN X-RAY

LABORATORY

6000 Skiagraphs taken within past aix years

SEND for book containing Skagraphs of Tumors Cyrta and Riood Clova in the Brain Road, Yescal, and Blazy Cai Green as Large Contained the Heart, Assuring Foreign the Heart, Assuring, Foreign Kidney, Tomors, Bose Disease, Fractives Dulcacinou, also Deformities of the Hip, Spac and other parts of the body

Established May, 1896 for Medical Diagnosis

W. C. FUCHS
406-407-403 Schiller Bidg
103-109 Randolph St.
CEICAGO

Telephone Central 1155



er of the rim of the Acctabalow in a physician. Differential diagnosts of this fracture home a fracture of the most of the forms and the contracture.





American and Australian Line

Offers a luxurious passenger service between San Francisco, Hawaii, Samoa, Tahiti, New Zealand and Australia. Around the World. Send 15 cents postage for handsome New Zealand book. Illustrated folder free. J. D. SPRECKELS @ BROTHERS CO., General Agents,

Company

643 Market Street, San Francisco B. R. DENBIGH, General Eastern Agent,

427 Broadway, N. Y.

Nature's method of providing against the admission of septic matter is by plastic infiltration then follows an

Effort to wash out the offending matter by an exudation of serum

TO obstruct this wise system by the use of escharotic antiseptics acts to

Produce conditions which have the effect of

delaving Resolu-

tion

Glyco-Thymoline

Aids nature in her pro cess of repair maintaining the fibrus in soluble form stimu lating capillary circulation fostering and sustaining cell growth resulting in the rapid formation of healthy granulations A practical dressing for all wounds burns

SAMPLES AND LITERATURE IF YOU MENTION

THIS JOURNAL RRESS @ OWEN CO.

and ulcerated conditions

210 Fulton Street

New York

LIGNOL in Surgery

Powerful Non Caustic Antiseptic

NATURAL OIL

Equal to 1 1000 Solution Bichloride Mercury Used in all Suppurative Conditions Ulcers Abscesses, Sinuses etc. Endomerities, Cervical Catarrha, Granular Erosions

The most perfect lubricant for Sounds and Speculums

A trial of this Natural Oil will demon strate its usefulness Literature and samples promptly fur nished on application

LIGNOL SOAP

Antiseptic Superfatted Dermatological Sonn Makes the most efficient, the most readily used also the cheapest douch. for the treatment of Leucorrhoea.

THE GIRARD COMPANY, Inc. Pharmaceutical Chemists

t303 Sansom Street Philadelphia, Pa

FLAVELL'S SUPERIOR APPLIANCES

ELASTIC TRUSSES

CAN BE WORN DAY AND NIGHT AR OFFERED TO PHYS CIANS AT LET PRICES



Single Truss-Adults Plan \$1.50 2 00 F ne SIL 2 50 DoubleTruss Adults Pla n \$2 50

F ne 3 00 Paramatic Pads Sik -4 00 G ve c reumierence of abdomen on I ne of Rupture State if for Right or Left

ELASTIC STOCKINGS

Give exact C reumference and ength in all cases Net Price to Physicians Sout Sik Fine 5 ik Thread each each each A to E \$2 50 \$2 00 \$1 50 A to G 4 25 3 50

2 50 A to I 6 00 5 00 4 50 C to E 1 50 1 25 1 00 E to G 1 50 1 25 1 50 A to C 1 25 Goods sent by ma Jupon rece pl of price Safe del very guaranteed RELIABLE GOODS ONLY

G W Flavell & Bro. 1005 Spring Garden St Philadelphia Pa



Dr. W. Keen, M.D., LL.D., F.R.C.S. (Hon.)Professor of the Principles of Surgery and of Clinical Surgery, Jeffersou Medical College, Philadelphia.

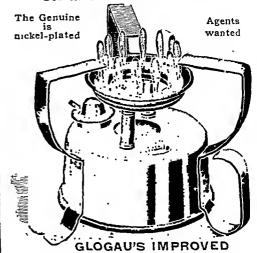
This new photo-etching from life is a real triumph of the engraver's art and is the accepted standard portrait of this, one of our greatest American surgeons. The size exclusive of margins is 16x 20 inches. Artist's proofs on India paper, signed by Dr. Keen, \$10.00.

Impressions with engraved title, \$5.00. Sent by mail in stout tube upon receipt of price.

ROBERT M. LINDSAY, PUBLISHER
11th and Walnut Streets, Philadelphia

THE VERY THING, DOCTOR,

You have been looking for ever since Sterilizers have been in use.



ALCOHOL GAS STOVE

Ideal for the Sterilizer, the Sickroom, or anywhere where gas is not available or desirable. Makes its own gas, uses only two cents' worth of alcohol in an hour. Burns odorless, wickless, small, compact, weighs only seven and one-half ounces. Will support a vessel weighing one hundred pounds. Cannot explode even if npset, and will not spill. Never gets out of order. Sent anywhere throughout the United States and Canada, express prepaid, on receipt H. GLOGAU, 757 Broadway, Room 8, of \$1.00.

A Profitable Investment

A SMALL AMOUNT OF Schwahn Reduction Company's stock, left unsold from its first allotment of 250,000 shares, is offered for subscription. There are 50,000 shares of stock to sell. The par value is \$1.00 full paid and non-assessable. These shares are offered at 50 cents per share, and will continue to be offered until the entire block is sold. The proceeds are used exclusively for the completing of the Company's works at Belleville, Ill.

The Schwahn Reduction Company (Incorporated) does a general manufacturing of Chemical Products pertaining to Aluminum, and will produce Metallic Aluminum and its Alloys and Products thereof. The manufacture of the Sulphate of Aluminum, the material from which the metal is produced, will be in full operation on a commercial scale from December 1, 1904, guaranteeing by its extensive use for many industrial and domestic purposes a handsome Dividend from the start. This is a conservative and strictly safe investment. The manufacture and the profits are based on valuable patents in the United States and abroad, permitting operation at a cost of at least fifty per cent. less than heretofore possible.

Write for prospectus and descriptive literature. Some of this literature will greatly interest physicians without a view to investments. Correspondence invited on this subject.

THE SCHWAHN REDUCTION COMPANY

601 Fullerton Building St. Louis, Mo.

From the Engineering and Mining Journal, November 10, 1904.

"The Schwahn Reduction Company, of St. Louis, has an exhibit in the Mines and Metallurgy Building at the World's Fair, designed for the purpose of bringing 10 the public notice the process of producing aluminum by a pyro-chemical reaction, or the 'Schwahn Process,' patented in the United States, Germany, and elsewhere. By this process the aluminum is reduced by means of heat and reducing gases from Sulphate of Aluminum, which may be produced from common clay, such as kaolinite, by the 'Schwahn process for preparing aluminum sulphate,' also patented. These processes are demonstrated and shown in this exhibit by numerous displays of the intermediary stages, beginning with the clay and ending with the final product—the metallic aluminum—thereby furnishing the proof of success. It is claimed the 'Schwahn Process' makes aluminum at such a cheapening of cost and purity that it will stimulate the consumption of the metal, and allow its use for many purposes which the hitherto high price has made prohibitory."

KUTNOW'S POWDER

For LIVER and KIDNEY DERANGEMENTS

THERAPEUTIC NOTES.

Kutnow's Powder is an ideal Antiseptic Aperient before and after operations. As a p st-surgical catherine nothing in the materia medical could easily replace Kutnow's Powder in order to overcome the names caused by the autothesia to stop the vomiting and at the same time to coax the peristalsis. Its therapeutic value has been thoroughly tested by many celebrated surgeons who have commended it in the lughest terms Kutnow's Powder is portable, economical palatable and always rehable. It is readily taken by women and children, and, centaining no sugar it is successfully prescribed in disbetic cases and for putients with a uric icid diathesis. Its advantages, says a medicil currespondent appear to arise from its possessing the power to climinate from the body the excess of bile and acids thereby purify ing the blood and strengthening the general tone by improving the assimilative processes of the debilitated system. Consequently it has a salutary effect in cases of hypochondriasis associated with low spirits and general depression ?

SAMPLES SENT FREE TO PHYSICIANS

SIGN THIS FORM

To obtain Kutnow's Powder Free of Charge

Name

Address

ANNALS IN SURGERY

end this form to knim w Bres Ltd 853 Bros Iway New York City

KUTNOW BROS., Ltd., 853 Broadway, New York City

And at 41 Farringdon Rd., London, E. C., England

BOOKS FOR SURGEONS

- BERRY.—A Manual of Surgical Diagnosis. By JAMES BERRY, M.B., B.S., F.R.C.S. 12mo; 363 pages. Cloth, \$2.00 net.
 - The Thyroid Gland: Its Diseases and Their Treatment. By JAMES BERRY, M.B., B.S., F.R.C.S. 121 Illustrations, from Original Photographs of Cases. Cloth, \$4.00 net.
- Burrell and Blake.—Case Teaching in Surgery. Containing complete clinical histories and physical examinations of 75 actual cases, serving as a basis for exercises in diagnosis, prognosis, and treatment. By Herbert L. Burrell, M.D., and John Bapst Blake, M.D. 12mo. Cloth, \$.75 net.
- BUTLIN.—The Operative Surgery of Malignant Diseases. By HENRY T. BUTLIN, F.R.C.S. Second Edition, Revised and Rewritten. Illustrated. Octavo. Cloth, \$4.50 net.
- Deaver.—Surgical Anatomy. A Treatise on Human Anatomy in its Application to the Practice of Medicine and Surgery. By John B. Deaver, M.D. With 499 very handsome Full-page Illustrations, engraved from original drawings, made by special artists, from dissections prepared for the purpose in the dissecting-rooms of the University of Pennsylvania. Three large volumes. Royal Square Octavo. Sold by Subscription, complete sets only. Half Morocco or Sheep, \$30.00; Half Russia, \$33.00 net.
 - Surgical Anatomy of the Head and Neck. By JOHN B. DEAVER, M.D. With 177 Full-page Plates, nearly all of which have been drawn from Special Dissections. One Royal Square Octavo volume. Half Morocco, \$12.00 net.
- Douglas.—Surgical Diseases of the Abdomen. With Special Reference to Diagnosis. By RICHARD DOUGLAS, M.D. 20 Full-page Plates. Octavo; 833 pages. Cloth, \$7.00; Sheep, \$8.00 net.
- JACOBSON.—The Operations of Surgery. By W. H. A. JACOBSON, F.R.C.S., and F. J. STEWARD, F.R.C.S. Fourth Edition, Revised and Enlarged. 550 Illustrations. Two volumes. Octavo. 1524 pages. Cloth, \$10.00; Leather, \$12.00 net.
- KEAY.—Gall-Stones: Their Medical Treatment. By J. H. KEAY, M.A., M.D. 12mo. Cloth, \$1.25 net.
- Kehr.—Diagnosis of Gall-Stone Disease. Including 100 Clinical and Operative Cases illustrating Diagnostic Points of the Different Forms of the Disease. By Prof. Dr. Hans Kehr, of Halberstadt. Authorized translation by William Wotkyns Seymour, A.B., M.D. 12mo; 370 pages. Cloth, \$2.50 net.
- Lees.—Acute Visceral Inflammations: Their Treatment. By D. B. Lees, M.A., M.D., F.R.C.P. 12mo. Cloth, \$1.50 net.
- MAYLARD.—The Surgery of the Alimentary Canal. By Alfred Ernest Maylard, M.B., B.S. Second Edition. 97 Illustrations. Octavo. Cloth, \$3.00 net.
- Morris.—Textbook of Anatomy. A Complete Textbook. Edited by Henry Morris, F.R.C.S. Third Edition, Revised and Improved. One handsome octavo volume, with \$46 Illustrations, of which 267 are printed in colors. Thumb Index and Colored Illustrations in all copies. Cloth, \$6.00; Leather, \$7.00 net.
- Moullin.—Enlargement of the Prostate: Its Treatment and Radical Cure. By C. W. Mansell Moullin, M.A., M.D., F.R.C.S. Illustrated. Third Edition, Enlarged. Octavo. Cloth, S1.75 net.
- ROLLESTON.—Clinical Lectures and Essays on Abdominal and Other Subjects. By H. D. ROLLESTON, M.A., M.D., F.R.C.P. Octavo. Cloth, \$1.50 net.
- Voswinkel.—Surgical Nursing. By Bertha M. Voswinkel. Second Edition, Revised and Enlarged. 111 Illustrations. 12mo. Cloth, \$1.00 net.
- WALSHAM.—Surgery: Its Theory and Practice. By WM. J. WALSHAM, M.D., F.R.C.S. Sth Edition, Revised and Enlarged, by WALTER GEORGE SPENCER, M.B., F.R.C.S. Svo; 1227 pages. 622 Illustrations, including 20 Skiagrams. Cloth, \$4.50 net.
- WRIGHT AND PRESTON.—Handbook of Surgical Anatomy. By G. A. WRIGHT, B.A., M.B., F.R.C.S., and C. H. Preston, M.D., B.S., F.R.C.S., L.D.S. 12mo. Cloth, \$1.50 net.

Complete Descriptions sent Free upon Request to the Publishers.

P. BLAKISTON'S SON & COMPANY

1012 WALNUT STREET

PHILADELPHIA

PNEUMONIA PLEURISY AND BRONCHITIS

Under the old modes of treatment the death rate from pneumonia was phe nomenally high—too high

Some will die under any treatment but those who are using

ANTIPHLOGISTINE

in treating their pneumonia patients find that many apparently hopeless cases recover

Most physicians now freely acknowledge that Antiphlogistine is far better than tee packs blisters counter irritants or poultices of any kind. Through a uniform degree of heat and moisture long and continuously maintained aided by a per sistent hygroscopic effect. Antiphlogistine tends strongly in the direction of flushing the capillaries. The relief of the pulmonary congestion and the overworked heart is further encouraged by Antiphlogistine's action upon the nerve terminals resulting in a dilation of the superficial vessels and the contraction of those deeply seated.

Once you have used Antiphlogistine on yourself your wife or your child you will ever after appreciate its efficacy

Follow Directions Carefully

Directions for Applying in Pneumonn —Prepare the patient in a warm room Lay litin on his side and spread Antiphlogistine thick and as hot as can be borne one one half the thorace wills. Core with a good warm cotton lined cheese cloth jacket. Roll the patient over on dressed side and complete the application. Then strich the front of the jacket. Prepure everything beforehand and work as rapidly as possible. The dressing should be renewed when it can be easily peeled off generally in about 24 hours.

The seamless air tight original container of Antiphlogistine not only insures its delivery in perfect condition but is economical for the patient—therefore always order in original pickage and speedly the size required—Small—Medium—Large or Hospital Size

(Never sold in bulk)

THE DENVER CHEMICAL MIG. CO. NEW YORK

OVAINE

New Local Anæsthetic

Chlorhydrate of Amylene. A derivative of the amino alcohols having the properties of the tertiary alcohols and used as a substitute for cocaine.

STOVAINE is a substance free from harmful properties and consequently unhampered by the fatalities which burden the popularity of cocaine. P. RECLUS,

Academic de Medecin de Paris, 5 Juillet, 1904.

The toxicity of STOVAINE is slight compared with the toxicity of cocaine. STOVAINE is a vaso-dilator.

We recognize the fact that for all local anæsthetics introduced of late years theoretical advantages over cocaine have been claimed, and in order that the merits of STOVAINE should be amply and clearly demonstrated, a very extensive series of experiments has been conducted in France, both in Hospitals and by private practitioners. The results of such experiments, with reports made to French scientific bodies, we will be pleased to forward upon demand.

The advantages claimed for STOVAINE over cocaine, briefly stated, are equal or greater analgesia and much less toxicity.

STOVAINE is prepared in the Laboratories of The Poulcne Frères Co., Ltd., of Paris, France, and is packed as follows:

CRYSTALS, in 1, 1/2, 1/4, and 1/4 ounce packages. It is also put up in SOLUTION, in bulk packages, and in glass tubes of strengths from 1 to 10 per cent.

STOVAINE SOLUTIONS are permanent and may be sterilized at a temperature of

WALTER F. SYKES & CO.

SOLE UNITED STATES AGENTS

85 WATER STREET, NEW YORK

396 Atlantic Ave. Boston.

R. R. Street & Co. Chicago.

132 Chestnut St. Philadelphia.

INDIGESTION

In those cases of INDIGESTION in which there is fermentation of the contents of the alimentary canal, with pain, sense of fulness, borborygm, and eructations, there is no remedy which will give such prompt and complete relief as EUSOMA (Echinacea Compound). statement can readily be verified by the use of the sample which we will send upon request.

EUSOMA is an ethical, non-secret preparation, and contains in each fluid dram, Echinacea Angustifolia, 15 grains, Thuja Occidentalis, 2 grains, and Baptisia Tinctoria, 4 grains. It is a perfect, non-poisonous autiseptic and alterative for both external and internal use.

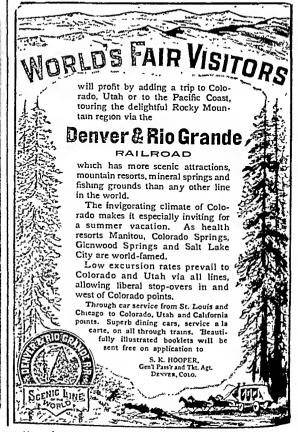
All septic conditions are promptly and favorably influenced by the internal administration of EUSOMA, which has well been termed the great corrector of blood dyscrasia,"

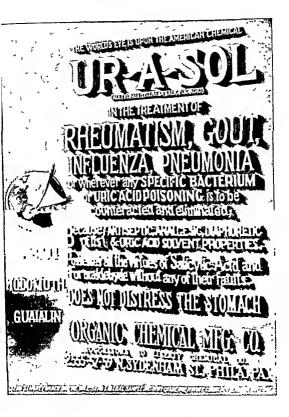
CLEAN WOUNDS always heal without suppuration, and INFECTED WOUNDS quickly become clean wounds when EUSOMA is used as a dressing.

Write for sample and booklet.

The Eusoma Pharmaceutical Co. CINCINNATI, OHIO

U. S. A.





The Winkley Artificial Limb Co.

LOWELL E. JEPSON, M. S., President. J. H. JEPSON, Secy. and Treas.

JEPSON BROS., (Sole Owners.)

Largest Manufactory of Artificial Legs in the World.



Manufacturers of the Latest Improved Patent Adjustable Double Slip Socket

ARTIFICIAL LEG

With SPONGE RUBBER, Mexican Felt, or English Willow FOOT Warranted Not to Chafe the Stump PERFECT FIT GUARANTEED



From Casts and Measurements WITHOUT LEAVING HOME.

Thousands of our Slip Socket Legs now being worn. U. S. Government Manufacturers. Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN., U.S.A.

IT IS RARE

to find any case of nervous exhaustion, malnutrition or anæmia, that will not respond to the use of

GRAY'S Glycerine TONIC Comp.

Immediate improvement with ultimate restoration is the usual result.

THE PURDUE FREDERICK CO.,
298 Broadway, New York

${f A}$ nnals of ${f S}$ urgery

Vol XLI

APRIL, 1905

No 4

ORIGINAL MEMOIRS.

STUDIES ON THE PATHOLOGY AND ETIOLOGY OF OBSTRUCTIVE HYPERTROPHY AND ATROPHY OF THE PROSTATE GLAND.

> BY PAUL MONROE PILCHER, MD, OF NEW YORK.

Ass stant Attending Surgeon to the Methodist Episcopal Hospital in Brooklyn

For the purpose of this study, there have been placed at my disposal specimens removed by operation in a series of twenty three cases in the clinic of Dr Lewis S Pilcher at the Methodist Episcopal Hospital, and for purposes of comparison various specimens of normal prostates

There are certain points in the anatomy of the normal prostate which should be made clear, since they are very poorly, and often incorrectly, stated in most of our text books, and are important in relation to that which is to follow

The gland is essentially composed of two lateral lobes, connected together in front of the urethra by the anterior commissure, and beneath the urethra by the posterior commissure. The prostatic urethra traverses the gland from base to apex a little in front of its middle. The position of this portion of the urethra varies, sometimes being more anteriorly and again more posteriorly placed. The cortex of the gland is made up almost entirely of non striped muscular tissue.

10

48 t

mixed with a small amount of fibrous tissue, which can be separated from the glandular elements with difficulty. This comprises what is known as the capsule of the prostate. Outside this is an indefinite sheath of fibrous tissue, in which is found the prostatic plexus of veins. Its identification and demonstration are difficult. The ejaculatory ducts and twenty or thirty prostatic ducts open into the prostatic urethra.

The organ is composed of stroma and glandular elements, the exact proportions of which vary. This range of variation is relatively great, in the writer's opinion more so than in any other gland in the body, being affected by age, function, and the calls of nature upon it. According to various careful observers, the glandular elements make up from one-third to five-sixths of the substance of the gland. The very fact of such a discrepancy in the estimates of these men shows how great the variation may be. The gland consists of forty to sixty lobules of the alveolar type. These lobules, however, are not distinct, and are traced with difficulty.

A number of alveoli empty into a single duct, a few of these ducts opening into a larger main duct which opens obliquely into the urethra. The alveoli are lined with columnar epithelium. The stroma is composed of muscular and connective-tissue elements in varying proportions. This, too, is influenced by age and function. Elastic tissue is also present. The small blood-vessels and capillaries run through the Connective-tissue cells,—especially numerous and large in the young,-plasma cells, and leucocytes are scattered throughout the connective tissue. From the dense capsule, according to Walker,1 whose studies are among the most complete of recent writers, strong bands of muscular tissue and connective tissue pass into the gland and subdivide, surrounding the lobules. The muscular divisions give to each lobule a distinct circular and longitudinal coat; the circular fibres ramifying among the lobules in a figure-of-eight course; the longitudinal layer lying immediately next to the gland substance, encasing the lobule more or less completely. The connective tissue ramifies among the cellular tissue, forming a

net-work on which the cells rest The existence of a membrana propria is questionable. The elastic tissue forms a small but important element of the stroma. Arising from a longitudinal sheath of fibres surrounding the urethra, the fibres pass outward and form a net work around the prostatic ducts, giving to each a distinct sphincter. (Walker.) The fibres extend more deeply into the gland, among the connective-tissue bundles and around the lobules.

PATHOLOGICAL CHANGES

The specimens which have been studied by us have all been those removed from patients during life, for the relief of urinary obstruction

I Grass -In these cases we have found three distinct types of prostates One the greatly enlarged, soft prostate, second, the relatively small, controcted, hard prostate, and a third, mixed type I may add here that in cases giving a positive gonorrheeal history each type has been seen same is true of the cases giving an absolutely negative gonorrhoeal history, and in the cases where there was no cystitis, and also where cystitis was present. Thus of the nineteen cases where there was no gonorrheal history, the prostate was of the large, soft variety in ten cases, small and hard in three cases, of the mixed type in six cases. Of the gonorrhoeal cases, two presented large, soft prostates, and two of the mixed type Of the cases with cystitis, two of the prostates were hard and contracted, five of the mixed type, and seven of the large, soft variety Of the cases in which there was no history of venereal disease and no cystitis, one presented a small, hard prostate, three large, soft prostates, and two the mixed type. So it would seem that infection did not in any way influence the variety of the pathological changes

The massively hypertrophied prostates vary greatly in their form, consisting either of an enlargement of both lateral lobes, of one lateral lobe, of the lateral lobes and a median enlargement projecting into the bladder (Figs 1 and 2),—this is the most common,—or a median enlargement alone

An enlargement of the posterior commissure is rarely seen, and of the anterior commissure never. The entire gland is surrounded by a thickened capsule of non-striped muscular fibres containing a small amount of fibrous tissue (Figs. 1, 2, and 3). This capsule is thicker and better defined than in the normal prostate; its fibres are more distinct, and it can more easily be stripped away from the gland proper. It entirely surrounds the glandular mass (Figs. 1, 2, and 3), and, covering the portion which projects into the bladder, it lies immediately beneath the mucous membrane lining the bladder (Fig. 1), the sheath being absent here. In the suprapubic operation, when the entire gland is removed, this capsule is not disturbed, but is shelled out with the gland from the sheath covering the prostatic body (Fig. 1). In this way the prostatic plexus of veins is exposed, and dangerous hæmorrhage may occur. In the perineal operation this muscular capsule is opened into, and the hypertrophied glandular masses are shelled out without exposing the veins, and the capsule is left behind. The surface of the hypertrophied prostate is irregular, presenting bulgings and valleys corresponding to the uneven hypertrophy of the glandular, muscular, and connectivetissue elements. In bilateral enlargement the sphincter vesicæ is not destroyed, as it generally is in the other forms. Retention results from purely mechanical means.

The urethra is distorted, depending upon the size, direction, and extent of the hypertrophy (Figs. 2 and 3). It may be lengthened and compressed, its plane depressed downward and backward, and sometimes curved laterally. The nucous membrane lining the prostatic urethra is intimately related to the gland itself, and can only be separated from it with difficulty (Fig. 4).

The size of the obstructing prostate varies from the normal size, 200 to 300 grains, to several ounces. The weight of the largest in the present series was five ounces.

The atrophic form, on the other hand, may be even smaller than normal. In the cases of this type operated on by us, the average amount of tissue removed was about 250 grains. In



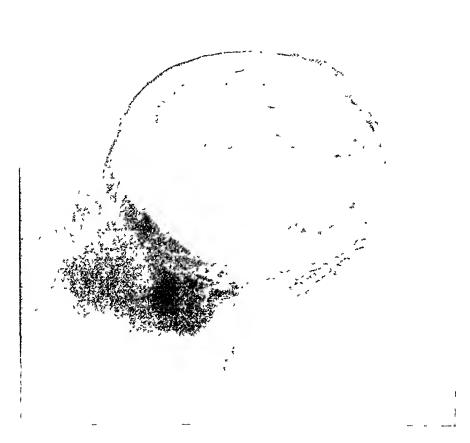


Fig. 2 —Photograph of cross section at B of specimen shown in Fig. 1. Showing capsule, distortion of urethra, and distribution of hypertrophy.

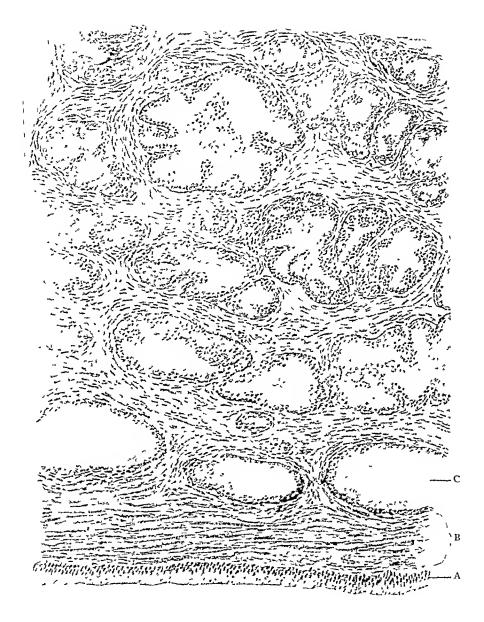


Fig. 4—Showing relation of the mucosa of the prostatic urethra to the substance of the prostate. Camera lucida drawing from same section as Fig. 3. Note the intimate relation between the epithelial layer, A, and the underlying fibromuscular layer, B, which is not in any way differentiated from the musculo-glandulo fibrous layer, C, which makes up the bulk of the hypertrophied prostate. In the musculofibrous layer, B, the muscular elements predominate.

these cases the disease affected both lateral lobes, with in some cases a very small median enlargement. The prostate is hard and firm, the capsule densely adherent. The sheath and the fibrous connective tissue of the perineal outlet, in general, are more dense and tough, rendering the identification and isolation of the perineal structures more difficult. The surface of the gland is very irregular. The direction of the urethra is distorted, but not much increased in length. The patients presenting such prostates suffered more from retention than from incommence.

II Microscopical - Sections of the hypertrophied pros tate vary greatly in the distribution of the pathological changes The most striking change from the normal is the relative and absolute increase in the amount of glandular tissue All degrees of change from the normal alveoli to the formation of cysts and large adenomatous like masses are seen (Figs 5 and 6) The ducts are in many places dilated and filled with retained secretion, often degenerated epithelium, leucocytes, amylaceous bodies, and calculi These contents may even obstruct the ducts In the tissue surrounding the ducts are often seen round cells and polymorphonuclear leucocytes. In some places the ducts are seemingly constricted Laurences found by injecting fluid metal into the urethra, that unless a high pressure was used, the glands in normal prostates could not be injected because of their small caliber. On the other hand, in the hypertrophied prostates the injection was easy and more complete because the terminal (urethral) tubules were en larged and dilated, and did not obstruct the influx of the metal

The glands and acm are greatly but unevenly dilated and hypertrophied (Figs 3 and 4). A whole lobule may be en larged without any dilatation of the acmi, presenting the appearance of an adenoma, but differing from it in that it has a definite, active secretion which is emptied into the urethra by the ducts. A small portion of a lobule or a single acmismay be affected. Crandon explains this fact as due to obstruction of the main duct in the first case, or to the obstruction.

tion of one or more of the smaller ducts, as the case may be. This explanation, however, is very unsatisfactory. Crandon in his article 6 presents an illustration showing a few scattered glandular elements beneath the mucous membrane of the bladder just at the beginning of the urethra, from which it is claimed the median enlargement develops. How can the theory of the obstruction of the ducts of these few scattered glands account for the great median enlargement which is often seen, containing many thousand times more secreting surface than in the normal, and in which there appear no cysts larger than are found in the normal functionating gland? The whole picture is not one of passive dilatation, but of active hyperplasia and hypertrophy (Figs. 3, 4, and 5). The alveoli contain débris, desquamated cells, amyloid bodies, concretions, and often leucocytes; but these, too, are found in normal functionating glands.

My own observations as to the relative change in the amount of muscular tissue in the hypertrophied prostate does not agree entirely with that of other workers. The two coats surrounding the dilated acini do not show as distinct a differentiation as in the young prostate. From the nature of the glandular change, it is natural to suppose that the surrounding tissue will be distorted, but not necessarily changed relatively. It is only when the wall between two adjacent acini becomes thinned down to one or two layers of cells that the muscular fibres disappear (Fig. 5), and only the connective-tissue framework remains. In fact, in many cases the muscular tissue shows a moderate but true hypertrophy.

The amount of connective tissue varies in different specimens. Most observers claim it is everywhere increased, but not relatively as much as the glandular tissue. I cannot entirely agree with this. It is true that in many cases the connective tissue is increased relatively, but sometimes the proportion of muscular hypertrophy is almost as great as the connective-tissue increase (Figs. 4 and 5). Throughout this tissue at different points varying degrees of round-cell infiltration are to be seen. In some cases arteriosclerosis of an

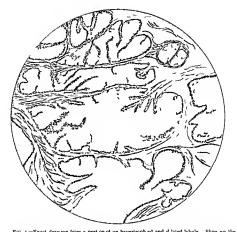


FIG 5—Fract drawing from a port on of an hypertroph ed and d lated lobule. Showing the thin no out of the musculofibrous stroma. The lighter areas of the stroma represent inoscular tasse and the heavier I nos connective tissue. In some piaces the walls separating the actini have disappeared.

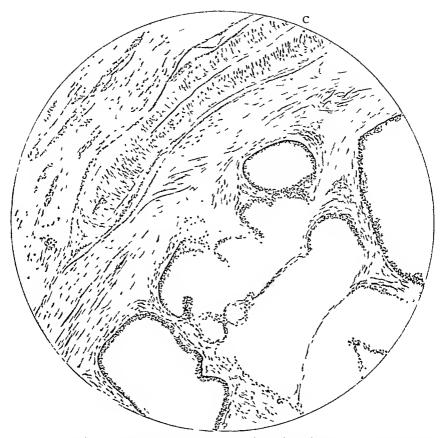


Fig. 6.—Exact drawing from periphery of same lobule as shown in Fig. 5. Showing a sclerosed vessel whose lumen is represented by a single line of endothelial cells, C. Note how the vessel wall is separated from the fibromuscular structures of the lobule, just as the fibromuscular capsule of the gland is from the glandular body itself. Small areas of extravasated blood and round cell infiltration are seen.

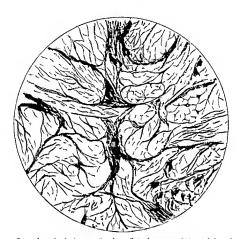


Fig. 7 = 1 xsct drawl g from a section of a small atrophic prostate which caused obstruction Showing it cabes et of glundrist elements and the great relative binervies in the muscular elements (The lighter areas represent int scular this ϵ the heaver lines connective (about ϵ).



Fig. 8.—Section from mixed type of hypertrophy of prostate $\$ Darker lines representing connective tissue and lighter areas unstriped muscular tissue between and around the gla-idular acini.

advanced stage is present (Fig 6) In many of our cases there were seen areas of extravasated blood (Fig 6) Again are seen areas of normal tissue

In the atrophic prostates two forms have been observed The first in which the glandular elements are decreased and smaller than normal. In these prostates the amount of musular tissue present seems to exceed the amount of new connective tissue, which in some cases is relatively dimnushed. In one case the predominance of muscular tissue was very marked (Fig. 7). The second form presents a combination of compressed glands which predominate, and a few dilated hypertrophied lobules which, however, never reach any considerable size (Fig. 8).

It is interesting to note here that Daniel, who examined a series of prostates removed post mortem from the bodies of patients not complaining of prostatic symptoms, i.e., were devoid of obvious enlargement, and who in many cases were under thirty years of age, found exactly the same pathological appearances, with some exceptions, as have been described

Ettology —Ciechanowski, quoted by Greene and Brooks, and Crandon concludes that "the common starting-point of the enlargement and certain forms of atrophy of the prostate is to be sought for in the productive connective tissue processes which occur in the stroma"

Before accepting this theory, consider first the life history of the prostatic body. Heisler ("Text Book of Embryology," 1899, p. 234) tells us that "in the twelfth week the future prostatic urethra acquires very thick muscular walls, and the original epithelial tube pouches out into the muscular tissue in the form of little sacs, the liming cells of which assume the character of secreting epithelium. In this way is produced the aggregation of muscular and glandular tissue known as the prostate gland." Until functional activity begins, the glandular elements appear as simple branched tubular glands resembling the other urethral glands and forming an insignificant part of the prostatic body. Then the function of the gland is demanded and the glandular elements multiply. The simple

branched tubular glands become most complex in their structure, and, just as in the female breast when functionating, become separated into distinct lobules. There then arises a new demand for expression of the glandular secretion; therefore the muscular elements increase and become better differentiated, and if the prostate be examined at this time, it will be seen to be essentially a musculo-glandular body, the acini filled with secretion, degenerated epithelial elements, amylaceous bodies, etc., just as in the functionating breast. actively functionating gland, varying greatly in different individuals, corresponding to the demands of its possessor upon its function. In one case we may have a glandulo-muscular body, in another a musculo-fibro-glandular body, and so on. As age advances, conditions change. In some, glandular activity ceases early, but generally not until after the degenerative changes incident to old age have made their appearance. In eight of our cases, where we have ascertained the age to which sexual intercourse was continued, the average was sixtyseven years. It is fair to suppose, then, that in these cases, at least, glandular function was kept up, and that possibly glandular hypertrophy took place in a perfectly natural way, influenced and governed by advancing age. From a study of these prostates, it has seemed to us that the hypertrophy was due more to glandular overgrowth, distorted and increased by the degenerative changes of old age, than to the influence of any extrinsic inflammatory agency constricting the ducts and causing their dilatation. The question may be asked why this does not take place in all cases. That is as difficult to answer as it is to explain why fibroids, myomata, and adenomata develop in the uterus of one woman and not in that of another. We believe that it is not necessarily the length of functional activity of the gland and the age of the individual which cause this hypertrophy, but that it is a glandular overgrowth influenced by the degenerative changes of old age in an actively functionating gland which produces the change. A previous gonorrhœal infection, or any other inflammatory process, may influence the development of the disease.

That, however, gonorrhæal infection is always, or even a frequent, cause of the pathological changes which have been described, is a theory which needs much stronger proof before it can be accepted. It is but fair to suppose, too, that other causes may influence this overgrowth. Excessive venery, over indulgence in alcohol, masturbation, protracted indulgence in withdrawal, sexual excesses, perverted indulgences, horse back riding, long continued sedentary habits, constipation, and climatic exposures, all may be considered as possible contributing etiological factors.

The following are the reasons advanced by Ciechanowski (Crandon, loc cit, p 843) for his belief in the correlation of gonorrhoza and the enlarged prostate

(1) The frequency of gonorrhœa,

(2) The frequency of chronic gonorrhosa in the posterior urethra and prostate, ie, in 1070 cases the process was in the deep urethra in 424,

(3) The frequency of cystitis, and lastly,

(4) The only domestic animal that suffers from enlarged prostate is the dog, and the male dog, too, seems to be the only animal that has a true purulent urethritis which is in fectious.

Compare these reasons with the following histories and facts

Case I —A gentleman, aged seventy four years, was admitted to the hospital in August, 1903. First experienced difficulty in passing water at the age of fifty two. Up to this time he states absolutely that he never had had intercourse with any woman. At the age of fifty-three he had intercourse with a woman for the first time. When he was fifty-four he began to use a catheter occasionally to empty his bladder. Married at age of fifty-six. His wife has borne him three children. Continued his marital relations to age of seventy three. In his seventy-fourth year we removed a large soft prostate weighing two ounces.

Case II —A gentleman, aged fifty seven years Always has lived a moderate life Never used tobacco or alcohol Denies absolutely gonorrhoa or any venereal disease Never had inter-

course with any woman excepting his wife. Married at age of twenty-five years. Moderate indulgence in coitus. Is a very intelligent man, and had no reason to conceal anything. Prostatic and vesical calculus symptoms for four years. October, 1904, removed a prostate weighing 750 grains, after removal of multiple calculi from bladder.

Case III.—A gentleman, aged sixty-six years; never had gonorrhoa or other venereal disease. Never had intercourse with any other woman than his wife. Never used tobacco or alcohol. Married at age of thirty-seven. Prostatic symptoms at age of sixty-two. Catheter life for four years; marked cystitis; by prostatectomy a moderately enlarged prostate weighing 300 grains removed.

Of our twenty-three cases, fourteen absolutely denied any venereal disease; four had in their earlier years suffered from gonorrhœa; and in the remaining five cases no history of gonorrhœa could be elicited at the time the history was taken, but they have not been asked since concerning it.

In this series of cases we have had to deal with men most of whom were far above the general average in regard to their habits, mental attainments, social standing, and education. If the history of cases is ever to be depended upon, it certainly seems fair to accept the statements of these men as truthful.

RÉSUMÉ.

- I. Pathologically there are three types of prostates causing urinary obstruction: (a) The large, soft type, (b) the hard, small, contracted type, and (c) the mixed type.
- 2. Infection does not influence the variety of the pathological change.
- 3. The contracted form of prostate is not a secondary stage of the large, soft type of hypertrophied prostate, but is distinct from it.
- 4. In many cases of hypertrophy of the prostate there is present a true muscular hypertrophy.
 - 5. In some of the atrophic cases the glandular elements

are relatively diminished and the muscular elements relatively increased

- 6 Gonorrhea is not an important etiological factor in the production of this disease, and there is no necessity for assuming it to be
- 7 The theory of obstruction to the ducts causing passive dilatation of the glandular elements, as advanced by Ciechanowski and Crandon, does not satisfactorily explain the pathological findings
- 8 Hypertrophy of the prostate results from glandular overgrowth, influenced by the degenerative changes of old age, and other agents which tend to produce the formation of fibrous connective tissue in an actively functionating gland

REFERENCES

- Walker A Contribution to the Study of the Anatomy and Physiology of the Prostate Gland, etc. Johns Hopkins Hospital Bulletin, Vol xi, p. 242
- Jores Ueber d Hyp die sog mittl Lappens d Prost, Virchow's Archiv, 1894 exxxv, 224
- Woolsey Applied Surgical Anatomy, p. 373
- *Herring The Cause of Enlarged Prostate, together with a Note on the Prostatic Gland British Medical Journal, October 29, 1904 p 1136 *Daniel Pathology of Prostatic Enlargement British Medical Journal,
- October 29, 1904, p 1140
 - *Crandon The Pathogenesis and Pathological Anatomy of Enlarged Prostate Annals or Surgery, Vol. XXXVI, No. 6, p. 832 *Ciechanowski Anat. Intersuch u. die sog Prostatabypertrophie u verw
 - Proz Mitt. aus der Grenz der med u Chir, 1900.
 - Greene and Brooks Nature of Prostatic Hypertrophy Journal of American Medical Association, 1902, xxxviii, 1051
 - Bierhoff A Contribution to the Study of Infections of the Prostate from the Urethra Medical News 1904 Vol lxxxv, No 17
 - "Keyes, Jr Does Gonorinea cause Prostatic Hypertrophy? Journal of American Medical Association. July 16, 1904.
 - Walker, J W Thompson pubic Prostatectomy p 1120.
 The Limits of Freyer's Operation of Supra-British Medical Journal, October 29, 1904.

HAS THE CATHETER A PLACE IN THE TREAT-MENT OF CHRONIC PROSTATIC HYPERTROPHY?

BY PAUL THORNDIKE, M.D.,

OF BOSTON, MASS.,

Assistant Surgeon, Boston City Hospital; Instructor in Genito-Urinary Surgery, Harvard Medical School.

IT is perhaps natural that the mind of a surgeon should deal with the important questions of the hour from the point of view which interests him most, and that the thinking and writing which he does should be approached from the direction of the "latest improvement" in the development of the problem at hand. This is certainly most strikingly shown by the tendencies of prostatic operating as reported at the medical societies and in the medical periodicals of the last few years. It is not so long ago that the younger surgeons of to-day cannot remember it, that the catheter was regarded as the main reliance of the surgeon for the relief of the discomforts and dangers of prostatic obstruction. It served the world long and faithfully, and now, if one can believe that the surgical literature of the day represents the beliefs of the representative men, it is carelessly thrown aside for procedures of a more radical kind. It is a still shorter time ago that Mr. Arthur McGill and his followers placed suprapubic prostatectomy within reach of the surgeon, and this procedure served the profession well and saved many lives. Now it, too, is being cast aside, with that same lack of care, for other and newer procedures of which there are still many things to learn. one should arrange his methods of treatment from a summary of the current literature of prostatic operating for the last two or three years he must inevitably reach the conclusion that a perineal prostatectomy of some kind is to be performed on most of the cases which consult him. This condition of affairs is due to the great improvements in anæsthetic and operative technique during the last few years, and also to the greater experience, and therefore increasing confidence, of surgeons It is certainly and happily true that radical operations upon the prostate are slowly shouldering the catheter and other methods of palliative treatment aside, and are giving them a smaller and smaller field of usefulness. But there are many cases unfit to endure the shock of such radical procedures, and there are others (is it heresy to say so?) which are better off with proper palliation than with a radical operation It would be a pleasant task to try to indicate some of the reasons why a suprapubic operation still has its field of usefulness, and why the Bottim procedure and other palliative operations may still be of the greatest value Such a task is, however, outside the scope of these remarks, which shall confine themselves to an effort to point out some places where the catheter is still to be recommended and used

Every surgeon is consulted by patients whose troublesome symptoms have developed so slowly and so quietly that they seek relief from the surgeon at a time when they are very old infirm, and obviously bad surgical risks They are in a condition when no man would think of advising an operation of any kind except for reasons of imperative necessity. This statement is made with all due recognition of the tremendous improvement in the methods of prostatic operating and of the greatly lessened mortality statistics as a result of such improvement These cases may often be made comfortable for the rest of their lives by the daily use of the catheter, and if they are properly instructed in its use and are promptly cared for and supervised during the transition period through which they must pass on entering their catheter lives, they will not only remain comfortable, but will gradually acclimatize their bladders and kidneys to the encroachments of a catheter, and will continue living with a steadily diminishing risk from infections of a kind which threaten the integrity of those organs So long as these conditions pertain such cases are properly palliated, and such catheter palliation should be continued If such comfortable palliation ceases to be possible, the moment it ceases to be possible, the time for operative interference has come, even with the mentable risks

which a formidable surgical procedure offers to the aged and infirm patient. Up to that time the catheter is useful, after that time its use becomes abuse, and the then inevitable operation should be performed before the continued abuse of the catheter has existed long enough, with its accompaniments of pain, loss of sleep and exhaustion, to markedly diminish the chances of its success.

There is another kind of case in marked contrast with the preceding in which the patient who seeks relief is comparatively young, vigorous, and seems in a more than usually favorable condition for enduring a radical operation. Yet this patient has a bladder, clean to be sure, but overdistended for so many months or years that it has reached a point of atonic degeneracy from which it may never recover. Such a patient, if operated upon in never so thorough a manner, will still possess his atonic bladder, which will necessitate the use of the catheter for its proper emptying, just as it did while its obstructing prostate was still untouched. One of the writer's early prostatectomies was such a patient, and the complete and successful removal of a large prostate left the patient in exactly the same condition that he was in before the operation. Another patient of this kind is under the writer's care at this moment. He is sixty years old, in excellent condition to bear an operation, and has a large, soft prostate which could be enucleated very easily, but he has an absolutely atonic bladder, so that three catheterizations in the twenty-four hours leave him absolutely free from all discomfort, and he goes eight hours after a catheterization without the smallest desire to urinate. At the end of that time from twelve to sixteen ounces of urine are removed, but he never passes a drop for himself. This patient is being carefully catheterized and watched in the hope of a betterment of this bladder atony which has existed for so long; but the writer is firmly convinced that a prostatectomy at the present time would leave him in a condition much less satisfactory than his present state of absolute catheter comfort. Such patients should use the catheter regularly and at such intervals as to prevent daily overdistention of the

bladder, until such time as the bladder shall rejuvenate itself to a degree which will enable it to empty itself, at least in large measure, after its obstruction is removed

"There is still another class of cases which consult the surgeon early in the development of the obstructive conditions for symptoms which may seem to them trivial Examination reveals a prostatic hypertrophy with some residual urine and a clean bladder If the amount of retained urine is only an ounce or two, it is usually possible to palliate annoying symptoms, and it is surely unwise to resort to a routine use of the catheter Such cases are often made comfortable for many years, or for their lives, by an occasional visit to the surgeon, and, although the time may come when what might be called a prophylactic prostatectomy will be done for such patients, that time has certainly not come yet, and we are no more justified in removing the prostate from such a case than we should be in removing the appendix from a patient who had experienced one mild and doubtful attack of appendicitis

"If, on the other hand, the obstructive conditions have progressed a little farther and the amount of residual urine becomes evident that the continuance of the existing conditions is impossible, and the patient must either be taught to empty the bladder one or more times daily, according to the amount of retained urine, or that some operation for the removal of the obstructing masses must be performed Many such patients are ignorant, poor, and live amidst a set of conditions which render surgical cleanliness next to impossible and unattain able These patients should be operated upon at once, while the bladder is still clean, and while all the conditions are most favorable, rather than take the almost certain chance of severe and persistent vesical infection and its attending dangers Other such patients are intelligent, cleanly in their habits, and live with a set of conditions which makes anything possible These are the cases over which most difference of opinion exists They must have either a routine catheter life or an operation. If the former, they are taking chances of an infection

of the bladder and kidneys which is almost certain to come sooner or later. If the latter, they are face to face with a formidable operation and a 5 per cent. mortality.

"The writer believes that the catheter still has a field of usefulness in such cases, many of which need a catheter only once or twice a day, and are kept in perfect comfort by its proper use. Of course, more or less severe infection of the bladder occurs sooner or later in most prostatics who are leading a catheter life; but it is the writer's experience that, in the class of patients of which we are speaking, most of these infections quickly quiet down and leave behind them an acid urine with, at the most, a thin cloudiness as its only departure from normal standards. It is the writer's custom to have long talks with such patients, to explain the conditions as carefully as possible, and to offer a choice of the two methods of procedure, but also to offer definite advice in favor of the catheter as the best treatment for the immediate future. This means that all but a few patients embark on such a catheter life, and continue under it until it becomes difficult and therefore unsafe, or until it proves so irritating that pain and frequency of urination render its future utility doubtful. This time may never come or it may come very soon. When it does come, and as soon as it does come, the time for catheter palliation has passed, and the time for operation has come." *

These, then, are some of the indications for the more or less permanent use of the catheter. The writer firmly believes that while many of the miserable men who were formerly dragging out a painful existence with the aid of the catheter, because there was no alternative to offer them, are now well and happy after a properly performed prostatectomy or other less radical procedure, others who were then made comfortable and content by the daily use of the catheter may still be made so by its aid. The fact that we have several new strings to our bow does not mean that the old one is worthless and must be thrown away.

^{*} Quoted from the writer's paper in the Colorado Medical Journal for July, 1904.

PROSTATISM WITHOUT ENLARGEMENT OF THE PROSTATE.1

ITS DIAGNOSIS AND TREATMENT

BY CHARLES H. CHETWOOD, M D,

Attending Surgeon to Bellevue Hospital Professor of Gento-Urmary Surgery in the New York Polychnic Medical School and Hospital

PROSTATISM is commonly understood to signify a train of symptoms accompanying that blight of declining years,—senile hypertrophy of the prostate. That this same train of symptoms is encountered independent of prostatic enlargement there can be no question, and it is for the purpose of calling attention to the condition most notable in producing prostatism without enlargement of the prostate that this brief communication is presented.

The particular train of symptoms embraced in the above the consists of urgency and frequency of urnation, pain during and after the act, and partial or complete retention of urne. When met in an individual past the age of fifty, this collection of symptoms—if there be no marked increase of urnary frequency or vesical hæmaturia during the muscular activity of the day to indicate the presence of neoplastic growth or stone in the bladder—is more likely to suggest to the mind of the ordinary medical observer prostatic hypertrophy than the malady I am about to describe

This morbid condition, which is so common a cause in the production of the symptoms of prostatism, is best expressed under the title of "Contracture of the Neck of the Bladder". It has been described by earlier authors under different names, resulting in an imperfect understanding of the nature of the malady

In a communication delivered before the American Association of Genito-Urinary Surgeons, May 2, 1901, I have en-

 $^{^{\}rm 1}\,{\rm Read}$ before the Medical Society of the State of New York, February 1, 1905

deavored to collect the multiplicity of titles variously applied to this condition under the one employed for a long time by my honored colleague, Dr. Keyes.

Contracture of the neck of the bladder is, in substance, a fibroid stenosis of the vesical orifice. It is not a hyperplasia of the muscular elements of the sphincter or of the adenomatous tissue; it is not a simple spasm or a mucous fold, but a fibrous infiltration inflammatory in character.

Its cause may be found in previous chronic inflammation of long standing in front of or behind the sphincter vesicæ. Such inflammation may or may not be gonorrhæal in type. As its existence depends upon an inflammation either of high intensity or of protracted duration, it is more frequently of gonorrhæal origin.

It may occur in the young as well as in the aged, and is found alone during the mature stage of prostatic hypertrophy; or it may coexist with this latter condition, when it is often the real cause of the associated symptoms. In other words, we may have an enlarged prostate of such dimensions as to leave no doubt of the existence of such a growth; and yet there may be no symptoms accompanying the enlargement, unless there is a coexistent contracture of the neck of the bladder, or unless the prostate itself is directly obstructive to the vesical outlet. Sir Henry Thompson recognized this fact, and in an article written in 1883 refers to obstruction of the bladder outlet, which occurs with and without coexistent prostatic hypertrophy.

That there is confusion in the minds of many operators and writers, even at the present day, between contracture of the neck of the bladder and prostatic hypertrophy is evidenced by a glance at the current literature of this and foreign countries, which is sufficient to justify an attempt to assist at clearing up the situation by calling attention to the diagnostic features and clinical cases bearing upon this question.

M. Lemeau, in a communication to the *Annales des Org. Urin.*, November 15, 1904, calls attention to what he terms an interesting case of error in diagnosis.

The patient was an extremely feeble old man, affected with acute retention of urine Rectal examination revealed an enormous tumor, and a diagnosis of neoplasm was made Upon opening the bladder suprapubically, it was revealed that the tumor was due to vesical distention with urine, there being entire absence of any tumor or prostate enlargement Obliteration of the urinary orifice was almost complete by what the author described as 'simple spasm,' but it was undoubtedly an example of the condition now under consideration. The patient succumbed to that secondary state so often produced after prolonged prostatism.—namely, pyelonephritis

Another case was reported in the same issue by MM. Reynes and Montfort. A patient seventy eight years old was sent to the hospital with a diagnosis of prostatic hypertrophy. Upon rectal examination, no notable enlargement of the prostate gland could be distinguished. There existed, however, the usual symptoms of prostatism,—dysura, incomplete retention of urine, etc.—requiring the patient to rely entirely upon the catheter for six months previous. A suprapuble opening was made, no hypertrophy of the gland was found, but, as expressed by the writer, a selerosis

of the vesical outlet

In another issue of the same publication, Dr Moran, of Brest, contributes a note on a case of prostatism without a prostate The history of the patient was the subject of this commumeation, and the progress, symptoms, and results of two operative interferences composed a detailed report. The patient was sixty-five years of age, and for one year previously had complained of all the symptoms common to prostatism. In early years he had suffered from urethritis, and the symptoms had become much aggravated several weeks previous to his examination. A No. 20 Charriere sound was introduced through the urethra without difficulty, meeting a slight resistance on reaching the vesical sphincter On rectal examination, slight enlargement of the prostate was revealed There was residual urine to the amount of 300 grammes The diagnosis of hypertrophy of the prostate -probably of the middle lobe-was made Operation was sug gested, but refused The patient did not improve under bladder lavage, and was finally induced to submit to surgical interference which consisted in a Bottimi-Freudenberg galvanocaustic operation By this time the retention had become complete, voluntary urination being impossible. As only partial improvement was thus obtained, exploration through a suprapubic incision was determined upon a month later, when, encircling the neck of the bladder, was found a fibrous ring which had not been completely severed by the Bottini operation. It was then incised through the suprapubic opening by means of a thermocautery.

The result of this second operation was excellent. The urine became clear and free of inflammatory elements, and the residual urine diminished from 300 to from ten to thirty grammes.

The author summarizes this observation—which was a most interesting one—as a case, relatively rare, of prostatism without the prostate, due to a sclerotic formation of the vesical neck, sufficient to obstruct the outflow and interfere with the efforts of the bladder to evacuate itself; and, after section of the obstruction, a return of the bladder to complete functional activity.

Many other cases of similar character might be mentioned in support of the statement that contracture of the neck of the bladder is a more frequent cause for the symptoms designated than is generally recognized; that it is often confounded with hypertrophy of the prostate, and that its existence should always be considered in a differential diagnosis.

As may be seen from the accompanying cut (Fig. 1), taken from a cast of the natural subject, the normal vesical orifice is of sufficient dimensions to freely admit the entrance of the finger; whereas, when it is the seat of contracture, it may be so stenosed as to just barely admit the finger-tip, or to be almost completely occluded.

The second illustration (Fig. 2) is taken from a postmortem subject, and is a fair example of this obstructive condition. Its recognition during life is not difficult. When existing independent of prostatic hypertrophy, rectal touch will reveal a normal gland; and measurement of the urethral length, one within the normal limits, namely, seven and threequarters to eight and one-quarter inches. The catheter may yield little or no residual urine when the bladder's compen-

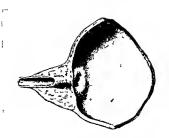


Fig. 1 —Section showing normal vesical orifice and prosta e

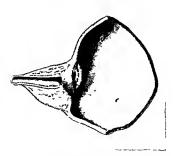


Fig. 2—Section showing contracture of neck of bladder. Normal prostate

		•	

satory power is sufficient to overcome the obstruction (Cases 8, 10, 16, 23, and 26) Later on, however, when this compensatory power fails, or when the obstruction is valve like or complete, residual urine will exist, from one ounce (incomplete retention) up to the full capacity of the bladder (complete retention), and, when this point is reached, we will often meet with that symptom so common in old prostatics—pseudo incontinence of urine or urinary overflow. Before infection occurs the urine may be lumped and clear, but after cystitis supervenes all the symptoms peculiar to it will be in evidence.

Generally speaking, it may be stated that contracture of the neck of the bladder is the causative factor of complete or incomplete retention of urine in a patient presenting a normal urethral length and a prostate normal to rectal touch, in the

absence of tabes or other central lesion

A Thompson searcher introduced through the urethra may enter without difficulty, or may meet obstruction at the vesical sphinicter. The absence of prostatic intravesicular growth to account for the symptoms of obstruction will be noted, whereas the orificial contraction will be recognized by turning the beak of the instrument towards the bas fond, making gentle traction while rotating it from side to side. A full sized steel sound may enter the vesical orifice without marked difficulty, as this is the most distensible part of the canal, and moderate contracture may not be detected by the passage of a sound.

Finally, this diagnosis may be conclusively confirmed when, through a suprapulse incision, with one finger in the bladder and another in the rectum total absence of prostatic obstruction is found to account for the existing retention of urine, or, when a perineal incision is made, and the finger—when passed through the membranous urethra and the prostatic urethra—reaches the neck of the blidder and meets an impassable orfice so tight as to just admit the end of the finger or completely to obstruct its entrance

Beyond doubt, many cases of prostatic hypertrophy which have been operated upon with a view to removal of the hyper trophied gland without recognizing the existence of contracture of the vesical orifice result in failure to relieve the symptoms dependent upon the obstruction.

In the third cut (Fig. 3) is pictured a case of prostatic hypertrophy, in which, however, the obstruction at the vesical outlet is due not so much to the enlargement of the gland as to the constricted or contractured orifice. Failure to recognize this fact during operation would undoubtedly interfere with a successful result. The same condition may coexist with stone in the bladder, and failure to detect and remedy it will also result in a continuation of the symptoms, as the following case illustrates.

The patient, sixty-two years old, suffered from complete retention of urine in January, 1890, and had been dependent upon the catheter for several years. The bladder was suprapubically entered and two stones the size of horse-chestnuts removed from the bas fond, and an encysted third stone in the region of the ureter, there being no intravesical enlargement of the prostate. operation was completed by the removal of the stones. patient made a good recovery; but the complete retention was in no way affected by the operation, and he continued the use of the catheter for twelve years longer, when he consulted my colleague, Dr. Keyes, Jr., who recognized the presence of contracture of the neck of the bladder, and submitted him to the operation of perineal-galvano-prostatectomy. At this time his prostate was again found to be perfectly normal, the entire obstruction being due to the stricture or contracture at the bladder neck.

The patient was out of bed on the seventh and left the hospital on the eleventh day. Voluntary urination returned, and he was able to empty the bladder to within one ounce.

The presence of contracture of the neck of the bladder being determined, the most effective means for its relief is of next importance. To be of sufficient utility, simple incision of the obstructing ring is likely to be attended with very severe hæmorrhage; and it must be overdone to insure against the return of the condition in the process of healing.

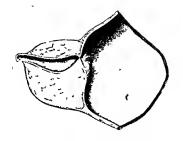


Fig. 3 -Contracture of peck of bladder with enlargement of prostate

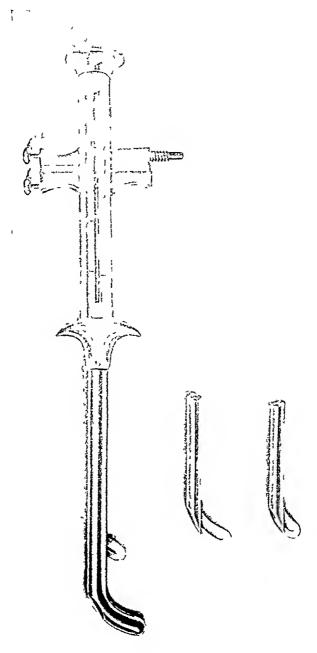


Fig. 4 -Chetwood galvanocautery prostatic incisor for use through a permeal opening

PROSTATISM WITHOUT ENLARGEMENT OF PROSTATE 503

The method adopted in all of the cases tabulated in this report is the writer's technique of galvano prostatotomy through a perineal opening

The galvanocautery incision is safe, bloodless, and effective. The instrument which I have had designed for this purpose (Fig. 4) is used through a simple perineal incision. The perineal opening is a means of exploration as well as of drainage,—a surgical advantage which needs no comment here

The experience derived from these thirty six cases would seem to justify the conclusions that contracture of the neck of the bladder is a common cause for vesical obstruction, that its relief is safe and sure by means of a galvano prostatotomy through a perineal opening, and, finally, that it is often an explanation for what has been termed "Prostatism without enlargement of the prostate"

CASES.
ATED
OPERATED
XIS-X
THIRTY-SIX
OF.
REPORT
TABULATED
TABU

	Postoperative Conditions.	Result.	Improved: bladder emp- ties: urinary frequency, and incontinence less.	14 mos. af-Improved; voluntary teropera, urination returned.	Cured: no residuum; dribbling less; kidncy	June, 1905 Unimproved; tubercu- lous condition progress-	Much improved; no pain and less frequency.	2 years af Improved; pain relieved; ter opera- bladder empties.	r mo. af-Cured; normal bladder ter opera- drainage.	wks. af- Improved as to urination are opera- and much less pain.	ter opera- drainage,	Improved; urination freer and less painful.	2 years af- Cured; no residuum or teropera- tion
RATIVE C		Last report.	Fcb. 10, 1902	14 mos. af ter opera	Jan., 1905	June, 190	None March, 1903	z ycars a ter opera	r mo. a	z wks. a ter opera	2 mos. af- ter opera-	Dec. 4, 1902	2 years af- Curcd teropera- pain. tion
	STOPE	Residuum.	None	3 02.	None	None	None	None	None	None	None	None	None
	Po	taoiraarion; Jagia	2. 2 to 3 li.	2.3 to 5 li.	Once	Q. ½ to ¾ h.	2 to 3 times	Once	Q. 3 to		Once or None	Once or None	Not at ali
		inolination;	Q. 2 to 3 h.	Yes July 28, Q. 3 to 1901 1901	Ycs Nov. 20, Q. 4 to 1900 5 h.	Vcs Dec. 18, Q. ½ to Q. ½ to None 1900 1900 1900	Q. 2 to 3 h.	Jan. 10, Q. 3 to 1901 4 li.	Q. 3 to 4 h.	Jan. 12, Q. ½ to Q. 1 h. 1901 ¾ h.	Jan. 22, Q. 3 to 1901 5 h.	Q. 3 h.	Q. 3 to 5 h.
		Operation.	Scpt. 1900 Feb.	1901 July 28, 1901	Nov. 20, 1900	Dec. 18, 1900	March, 1901	Jan. 10, 1901	Jan. 14, 1901	Jan. 12, 1901	Jan. 22, 1901	Jan. 29, 1901	Feb. 5, 1901
	suo	Kidney complicati	No No	Ycs	Ycs	Ycs	°Z	°Z	ů	°Z	ž	Š.	°Z
		Prostate,	Not en- larged		Not en- larged		Not en- larged		Normal Aeutesup- No puration	Not en- larged	Not en- larged	Not en- larged	Not en- larged
_	gth.	grei lerdierU	Normal	Normal Not en- larged	Normal	Normal Nodular	Normal	Normal Not cullarged	Normal	Normal	Normal Not en- larged	Normal Not en- larged	Normal
١.	ioliil	General cond	Good	Good	Fair	Poor	Fair	Poor	Good	General tuber-	Good	Good	in- Good
-		Previous condition.	Chronie eys. Good	Chronie cys-Good	Chronic ure- Fair thritis	Chronie tu- Poor berculous	eystitis Chronie cys-Fair titis	Chronie ure- thro-cystinis	Chronie pos-Good	Acute and General Normal Not en- dronic eys- tuber-	Chronie pos- Good terior ure-	Acute and chronic eys-	tuts Chronic complet retention
İ		Duration.	Scveral	8 mos.	Many years	Several	Several years	4 years	6 years	Scveral	Scveral	15 years	to years
	:s- toms	Other sympi or complic tions.	Suprapubic fistula	Stone	Dribbling	Hæmaturia;		ia; ain;		Great dysuria; Scveral læmaturia years	Great dysuria Scveral	Nonc Acute relapses 15 years Acute and Good of cystitis	Great dysuria
		Residuum.	1	C. R.* Stone	,5 oz.	½ 0z.	1 02.	2 02.	21/4 02.		2 0Z.	Nonc	10 02.
	.rdgi	n ; noitenitU	73 Yes Incoutl- Inconti- r oz.	Cath.	6 times	Q. ¼ h.	Q. 20 mit.	Q. 1 h.	33 Yes Q. r h. 7 times 2% 02. Prostatic abscess	Q. ½ to % h.	3 to 5 times	2 to 3 times	Q. r lı.
		Vrination; d	Incoutl- nence	Cath.	45 Ycs Q. r lı.	Q. ¼ h.	Q. 20 min.	45 Yes Q. r h. Q. r h.	Q. r h.	Q. ½ to Q. ½ to ½ h.	Q. r to	Q. 2 to 3 h.	Q. r.h.
1	indi	Previous ure	χ es	8	Ycs	Ycs	<u>:</u>	Ycs	3 ⊀cs	<u>:</u>	Ves	Ves	Š.
-		Date,	r Aug. 7, 73	Scpt. 10, 71 No Cath-	3 Oct., 45	4 Dec. 15, 33 Yes Q. ¼ h. Q. ¼ h. ½ oz. 1900	5 Dec. 17, 69	6 Jan. r, 48 rgor	7 Jun. 8, 33	8 Jan. 10, 31	Jan. 21, 29 Yes Q. 1 to 1901	ro Jan. 25, 39 Yes Q. 2 to 1901	11 Jan. 31, 46 No Q. 1 h.
I.		.oV) "	61	m	4	33	•	7	8	0	5	=

* Complete retention

CASES.
OPERATED
THIRTY-SIX
I OF
REPORT
CABULATED

Not en- No July, Q. 4 h. Once None reropental construction normal; anged and surged Normal Not en- Not en- No July, Q. 4 h. Once None reropental construction normal; anged and surged Normal Not en- Not en- No July, Q. 4 h. Q. 6 h. None reropental construction normal; anged and surged Normal Not en- Not en- No June 29, Normal Nor at None reropental construction normal; anged and surged Normal Not at None Reb., 1905 Cured; bladder drainage enlarged No Apr. 23, Q. 2 to Q. 2 to Q. 2 to None reropental construction normal; not en- Not en- Not en- No Apr. 23, Q. 2 to Q. 2 to None reropental construction normal; not en- Not en- Not en- No Apr. 23, Q. 2 to Q. 2 to None reropental construction normal; not en- Not en- No Apr. 23, Q. 2 to Q. 2 to None reropental construction normal; not en- Not en- No Apr. 23, Q. 2 to Q. 2 to None reropental construction from gradual larged normal; not en- Not en- No Apr. 23, Q. 2 to None reroperation from gradual normal; not en- Not en- Slightly No July 1, Q. 6 h. Once None femos af-Improved as to bladder reportance using reading through three reportance in normal incomition normal reroperation from gradual normal incomition from gradual reroperation from gradual normal regolution normal recoperation from gradual normal regolution from gradual normal regolution normal recoperation from gradual normal regolution normal recoperation from gradual normal regolution normal recoperation from gradual normal regolution normal regolution normal recoperation normal regolution normal regolution normal no	Q. 4 h. Q. 4 h. 2 ozs. 4 wks. af- Cured; voluntary urina- ter opera- tion returned.
No July	Q. 4 h. 2 ozs.
No July	Q. 4 h. 2 ozs.
No July	Q. 4 li.
g	
g gg	
g gg	No Jan. 9 1905
d da	°×
Prostate Not en-larged Not en-larged Not en-larged Somewhal enlarged Not en-larged	Ţ,
Normal larged Normal Not enlarged Normal Somewheningen larged Normal Somewheningen larged Normal Somewheningen larged Normal Somewheningen larged Normal larged	Normal Slightly enlarge
Good Good Good Good Good Good Good	Good
Chronic cys. Good titis and prostatic cys. Good titis and prostatic cys. Good titis and prostatic cys. Good titis Chronic cys. Bad titis Chronic cys. Good titis chronic cys.	to years Stricture; chronic cystitis
	to years
Precipitancy of urination Dysuria Citing morphin- citing and great digential urina- digential digent	
	i.
34.	quently quently C. R.
	quently
A A A A B S A B A B A B A B A B A B A B	66 Yes
6 4 6 5 5 5 5 5 5 6 Age.	
26 July 23, 66 Ves Q. 1 to 1994 29 Jan, 30, 39 Yes Q. 1 to 1994 30 Feb. 15, 65 No Q. 1 to 1994 31 Mch. 11, 43 Yes Q. 1 to 1994 32 Apr. 25, 60 Yes Q. 2 to 1994 33 May 2, 46 Ves Q. 2 to 1994 34 May 2, 46 Yes Q. 2 to 1994 35 Nov., 66 Yes Q. 3 m 1 1994	36 Jan. 9, 1905

* Complete retention.

SOME ANATOMICAL POINTS CONNECTED WITH THE PERFORMANCE OF PROSTATECTOMY 1

WITH REMARKS UPON THE OPERATIVE TREATMENT OF PROSTATIC
HYPERTROPHY

BY FRANCIS S WATSON, MD,

OF BOSTON, MASS.

Lecturer on Genito-Unnary Surgery in the Harvard Medical School | Jun or Vis ting Surgeon to the Boston City Hospital

As an introduction to the present paper, I desire to pay a brief tribute to a distinguished member of the Medical Society of the State of New York, whose valuable contributions to the subject under discussion may be appropriately recalled

I refer to Dr Gouley, of New York, who occupies a peculiarly important position in the history of the evolution of the operative treatment of prostatic hypertrophy Gouley was one of the only two surgeons to whom it may be said that we owe the transmission and the keeping alive of the operative treatment of this disease from the time at which its originator, the distinguished French surgeon Mercier, left the field, to that at which it entered upon its modern period, approximately the interval between 1865 and 1886, the other being Bottim. For the first ten years or so Dr. Gouley was the solitary one to observe in any systematic sense, and to appreciate the possibilities of, the operative treatment insistent advocacy of Bottini for the modification of Mercier's operation which he introduced did much to strengthen the position of Gouley, and though it was many years before either of their procedures received adherents, yet their service was not a slight one. But it is more especially to the particular

⁴ Read before the Medical Society of the State of New York February 1, 1995

contribution of Gouley that I wish to call attention; for, among the large number of those who have all at once in the course of the last few years so enthusiastically taken up prostatectomy, and especially perineal prostatectomy, few if any seem to be aware of the fact that perineal total prostatectomy was originally and definitely proposed by Gouley. This is, however, the fact, for he clearly describes that operation in a publication in 1873. The method has since been put forward by or attributed incorrectly to various surgeons in ignorance of this fact, just as we have seen, with less excuse, the same thing done with reference to certain of the old time classic perineal incisions which have been applied to the performance of prostatectomy, but which differ in nowise from the original form in which they were used for perineal lithotomy. I mean the inverted V and the inverted Y, which go back I do not know how far, but which were in common use in the middle of the last century, and the curved prerectal incision, so-called Zuckerkandl incision, which of course dates back 2000 years at any rate, it being the universally known incision of Celsus when cutting "on the gripe."

Gouley's operation is that of the rapid finger enucleation done through the sides of the prostatic urethra by the forefinger tip introduced into the latter through an ordinary external perineal urethrotomy incision. It is the operation which I have practised from time to time since 1889, having learned it from the verbal instructions of Dr. Gouley in 1884. the method which I still prefer. It is identical with the operation employed by Goodfellow, of San Francisco, who, not knowing Gouley's description, assumed it to be original with himself, and it is that practised by several others under a similar belief with regard to themselves. It emanates from Gouley, and I am glad to have the opportunity to say this, and to acknowledge, at the same time, my own sense of indebtedness to him for having originally directed my attention to the importance of the operative treatment and to its future possibilities.

In the remainder of this paper I would like to speak of

a few of the anatomical points which have a more especial bearing upon the performance of perineal prostatectomy

Fig I depicts a three lobed hypertrophy of the prostate. The gland, together with its envelopes, has been cut away from the bladder, and its anterior commissure has been divided by an incision extending into the prostatic urethra in order to expose the interior of the latter throughout and to give a view of the relations of the median and lateral enlargements to it. The points which are here demonstrable are as follows.

- I The completeness of the tumor formation in each of the three lobes, and the fact that they are definitely separable from the outer or fibrous sheath which encloses the gland
- 2 The thickness of the outer sheath, which in some cases, as here, is conspicuous
- 3 The well marked interval or space (f) between the surface of the gland and the inner aspect of the outer sheath. It is in this space that all enucleations of the gland should be conducted. The above features are by no means always so clearly defined as they are in this spectrum.
- clearly defined as they are in this specimen

 4. It also shows that the level of the lower border of the urethral aspect of each lateral lobe is a little above that of the floor of the prostatic urethra, consequently, also above the level of the ejaculatory ducts. Any operation, therefore, which does not involve injury to the floor of the prostatic urethra will not injure the ducts.
- 5 In this case the tumor formation of the middle lobe is, strictly specising, outside the urethra and intravesical, it is therefore also outside the sphere occupied by the ducts, and its removal need not implicate the latter in its performance

The enucleation without injury of the ducts is, theoretically at least, possible. How frequently it actually spares them, it is difficult to say. I shall show later that it is possible to preserve them when performing the operation according to the method of Goiley, contrily to what has been implied in a recent discussion, by Dr Young, who characterized the rapid finger enucleation as a blind procedure done in the dark, and a rough tearing out of the gland which disregarded injury to

the ducts. In a specimen obtained from a fatal case, in which five days before death I had enucleated the prostate by the method of Gouley, and had not given any attention to the preservation of the ducts, and which I had the opportunity to examine thoroughly post-mortem, I discovered to my surprise the ejaculatory ducts quite intact except just at their point of emergence on the urethral floor, where the verumontanum had been injured, and with it just the terminal parts of the ducts (this is illustrated in Fig. 11).

That the ducts may be preserved in the performance of the finger enucleation is further evidenced by the statements of Goodfellow, who reports the occurrence of apparently natural ejaculation in a considerable number of the patients operated upon by him, and by similar assertions on the part of some of the English operators in connection with the suprapubic operation; the actual figures have not, so far as I am aware, been given with regard to this point, but the statements are sufficiently explicit to indicate that the criticism of Gouley's operation or the claim for the superiority of one or another special technique in this respect are not well grounded. Since I have referred to this matter. I would add that the criticism with regard to the blindness of procedure of finger enucleation does not seem to me to hold good as a general statement, at any rate. That it is true for individuals I readily agree, but for those of us who practise it, the sense of touch is more accurate, delicate, and a safer guide than that of sight in the performance of this operation. The ability to see the steps of the operation I have not yet been able to acquire in the few cases in which I have endeavored to follow Dr. Young's manner of operating, because of the presence of blood and the fact that I have not succeeded in bringing into view the upper and more distant aspects of the gland during the enuclea-This, however, I readily acknowledge is very likely owing to my lack of familiarity with the method, and to being obliged to wean myself from another method of operating with which I have been familiar for many years. What I wish especially to make clear is that far too much attention has been

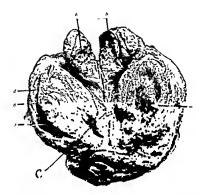
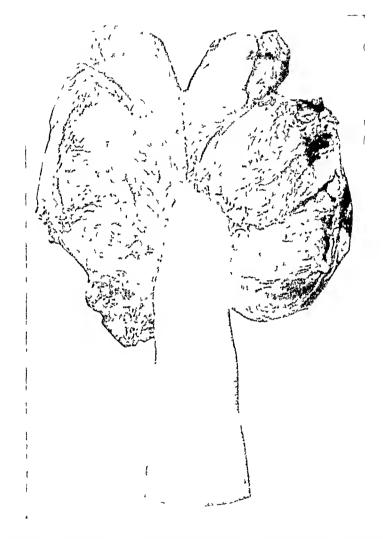


Fig. 1—Three-lobed hypertrophs. The glund and us outer sheath have been cut away from the bladder above and the anterior precipitate below. The glund has been divided longitudinally through its anterior commosure and spread open to expose the interior of the prostate urchir. The middle lobe has been divided in the median line to us hase.

(4-a) The two lateral lokes (8-b) The two halves of the divided and the loke (c) The provided territoral floor (d) Outer aspect of the external floors when he opaulator) ducts (f) The space between the gland and its external fibrous sheath (Maxison)



Γισ 2—Γinger enucleation in the manner proposed by Gouley The enucleation; as the author usually begins it. Floor of prostatic urethra not injured necessarily. (Watson.)

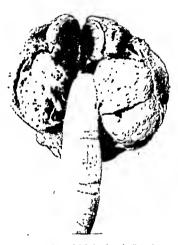


Fig. 3 —I sucleation a little further advanced (Watson)

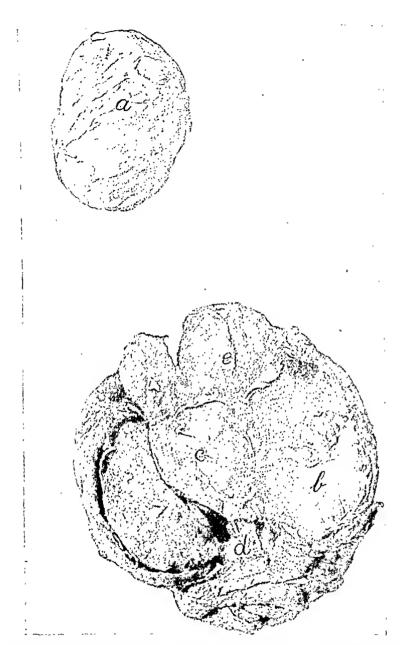


Fig. 4.—(a) Enucleated left lobe. (c)Roof of the chamber turned back in order to expose the interior of the chamber from which the lobe (a) has been removed. (b) Interior of chamber formerly occupied by left lobe. This has no communication with the chambers of other lobes. (Watson.)

directed to the question of the merits of certain special techniques. Many of them are excellent, and yield results so little different in character in any respect, that no important advantage can be claimed for one to the exclusion of the others. The really essential point for those who are experts in this special province is to bring home the fact to the profession at large that the operative treatment of prostatic hypertrophy has been brought to a sufficient degree of perfection to make it evident that the patients should be given the benefit of it, and should not be submitted to the daugers of catheterism as they have been in the past, until it is hopeless to interfere surgically in many instances.

Fig 2 shows the finger beginning the enucleation of one of the lateral lobes as I am accustomed to begin it when doing the enucleation after the manner of Gouley. It will be noticed that the floor of the prostatic urethra is not injured, but hes behind and beneath the finger and the lowest point of the urethral part of the enucleation.

In Fig 3 the finger has entered the space between the surface of the gland and the inner aspect of the urethral side of the outer sheath. The pulp of the finger-tip is held upward, and the pressure which is exercised by it in making the enucleation, and while separating the posterior surface of the gland from the outer sheath, will be directed always upward and outward, when the front and upper surfaces of the lobe are being deached, the pressure is made laterally, at no time should it be directed downward towards the rectum, for the latter is very hable to be injured if this precaution be neglected, particularly if the operator has failed to place the tips of one or two fingers of the other hand in the rectum while making the enucleation

In Fig. 4 one lateral lobe of the gland has been enucleated by the finger. This has been done in this instance by entering the fibrous sheath through the upper part of the side of the urethra, and that side of the urethra together with the urethral aspect of the fibrous capsule is turned bick across the floor of the prostatic urethra in order to expose to view the interior of the chamber within which the lobe was formerly enclosed. It will be seen that the inner wall of this chamber is elsewhere intact except at the part at which the finger broke through. Next it will be noticed that the outer side of this chamber is much thicker than its inner or urethral aspect. Again, it is to be noticed that the chamber and fibrous capsule which constitute its walls are wholly separate from the corresponding chambers of the other lateral and the middle lobes. as far as the gross appearances permit us to determine, the intravesical aspects of the gland are in this particular case obviously covered by the fibrous capsule as well as by the mucous membrane of the bladder, and not by the latter alone, as has been asserted to be invariably the case. It is in the outer, lateral, and anterior parts of the fibrous capsule that the extensive venous plexus runs, which fact makes it important not to wound that part of the capsule when removing the gland.

Fig. 5 shows in some respects quite the contrary conditions to those seen in the preceding figures. In this case there is an entire absence of the space between the gland and its outer fibrous sheath that was shown in the last figures. The contrary condition exists of an intimate and inseparable connection between the two. It is difficult to see any line of distinction between the gland tissue and the outer capsule.

The prostate has been cut almost, but not quite through, transversely not far from its vesical end, and the anterior half of it has been turned down and hangs by a thin strip of tissue to the posterior half, which is not separated at all from its natural connections from the bladder

The point that I wish to emphasize in connection with this specimen is that when such a condition as that which is seen here is met with, the operator should not persist in the attempt to enucleate, for enucleation is impossible to effect properly or safely in such a case, because of the wounding of the outer capsule, which is practically inevitable under the circumstances, and the hæmorrhage which will result. Removal will be best accomplished by morcellement, and it is wise not to try to effect a complete removal, but to leave a thin layer of



Fig. 3.—Specimen of the author's showing gland in which the attachments between sheath and the surface of the glant are very intimate and make the case one in which it is difficult or impossible to enucleate.

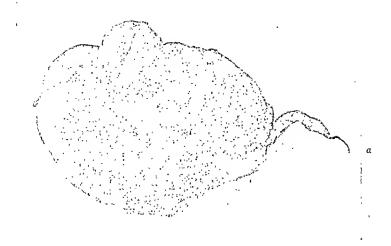


Fig. 6.—(a) Bit of the capsula vera turned back from the left lobe. (Watson.)

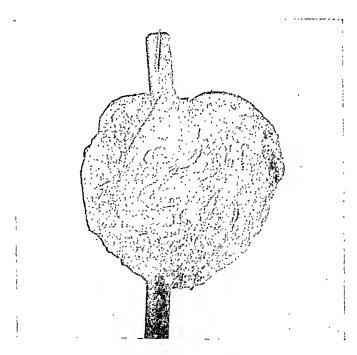


Fig. 7.—Two lateral lobes and prostatic urethra enucleated in 1897 in one mass by suprapubic prostatectomy. (Watson.)



Fig. 8 —(a) Tw. laterally best [ib] Med an i-beremoved by Gouley's perincal prostatectomy (Matson.)



Fig. 9—(a) (b) and (c)_Middle and two lateral lobes removed by Gouley's perineal prostatectomy (Watson)

the gland attached to the inner surface of the outer sheath

Fig 6 A small bit of the inner or true capsule has been turned back from the side of one of the lateral lobes in order to show how close the connection is between the gland and the capsula vera, and also how thin and delicate it is compared with the outer or fibrous sheath

Owing to these two characteristics, enucleation cannot be properly carried out between the capsula vera and the gland surface, and if it is attempted, the operator will inevitably lose his way, and moreover will leave numerous bits of the gland attached to the inner surface of this thin capsule, and hence fail to make a complete enucleation

Figs 7, 8, and 9 show the gland after its enucleation in three different cases in one, two, and three separate masses respectively. The first specimen represents a bilateral hyper trophy of the gland which I removed in one mass together with the prostatic urethra by the suprapulic route in 1897, or some three or four years before Mr. Freyer published what he has termed his "new operation," which is done in identically the same way as that which I pursued in the case from which this specimen was taken

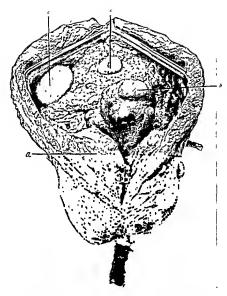
The fact that I removed the hypertrophied gland in one mast together with the prostatic ureflira did not strike me then, nor does it seem to me now, to constitute a "new" procedure that could be considered as distinctive in any essential sense of the word from the original suprapibic prostatectomy of McGill I refer to the point in order to recall the fact that the credit of suprapibic prostatectomy belongs to Belfield and McGill as certainly as it does not belong to Mr Freyer, to whom we do owe, however, the fact that it has been revived in England, and shown to a greater advantage than has hitherto been done by any one, and where it remains the favorite and almost the exclusively practised method, the sur geons of that country never having given any serious attention to the perineal operation which is so widely but far from

exclusively practised here in America and, though more exclusively, also in France within the last few years.

The figures also show incidentally how cleanly the finger enucleation is often accomplished, the fact being evident from the smooth surfaces of the enucleated masses. The method employed was that of Gouley in the two perineal operations in which the lobes were removed each as a separate mass, and the method of McGill in the case of the single mass.

The specimen from which Fig. 10 was taken is that of a very extensive three-lobed hypertrophy in which the median lobe reaches high up into the bladder and constitutes a condition which, it must be said, is not a common one, in which the Bottini operation becomes so difficult to perform as to make it unwise to attempt it, or, as I personally believe, impossible to accomplish at all, and in which it is so obvious that the growth is within the sphere of a suprapubic prostatectomy that that operation is clearly the one that common sense dictates to be the best to apply in such a case. This I have shown in order once again to emphasize the desirability of not becoming so possessed by the partisan view in favor of one operative method alone as to lose the receptive and elastic qualities that are among the best that a surgeon can have. It is this view for which I contended at the outset many years ago, and have always held ever since, namely, that the choice of operative method was determined by the forms and size of the glandular enlargements, and by the direction which they took with reference to the interior of the bladder, which occasionally made the suprapubic operation that of choice.

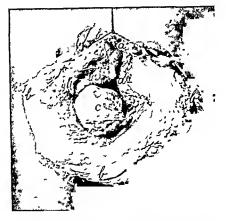
Fig. 11 depicts a post-mortem specimen from a case in which the patient died on the fifth day after perineal prostatectomy done by the rapid perineal finger enucleation already described as that of Gouley. Death was due to uræmia in connection with a chronic interstitial nephritis. The specimen represents in its upper part the interior of that part of the bladder immediately surrounding the vesical orifice which lies in the figure above a horizontal line drawn between a and a. The rest of the specimen which lies below this line shows the



Lto 10—1814 i er and part of prostatic urethra opened in front $\{a-a\}$. Extensive enlargement of the two lateral lobes $\{b\}$ Very large median bypertrophy $\{c|c\}$ Vesical calculi (Watson $\}$



outlet. The irregularly quadrilateral space included within the limits designated by the letters a-c-c-a, represents the inner surface of the fibrous sheath of the prostate and of the chambers formerly occupied by the lateral lobes. (d-d) The months of the ejaculatory ducts, a wire issuing from each. (c) Floor of prostatic urethra.



Fit 12—(4-9) Cut through second or fice closed again by suture. (4-5-4-5) Inner stace of bla lder immed ately surround g the vs. cal outlet the rest of the bladder having been cut a 33 from 1. (7) The modifie lobe of the prostate projecting min the bladder from the prostate curether. (In this flustrum on the lateral lobes are concealed by the bladder wall which intervenes to the them from vs. 6).



Fig. 13—a The vesical outlet after the removal of the prostate, b, b, b, b, inner surface of bladder wall surrounding it, which, it will be noted, is uninjured, c, c, seminal vesicles, vasa deferential etc.

space formerly occupied by the hypertrophied lateral lobes of the prostate, its presenting face being the inner aspect of the outer or fibrous sheath except along the middle line, about half way upon which the two wires emerge which is the floor of the prostatic urethra. The vesical orifice and anterior surface of the outer sheath have been cut through longitudinally in the middle line, and the whole interior of the space formerly occupied by the gland and prostatic urethra have been exposed to view by drawing apart the edges of the divided tissues. In the middle of the specimen are seen two wires one of which enters each of the ejaculatory ducts and traverses the whole of their lengths except a very small bit of them just behind and including their orifices, which were torn away in the course of the enucleation.

The particular feature which I wish to emphasize in con nection with this specimen is that the ejaculatory ducts may be saved even when removing the gland by the finger enucleation carried out through the median perineal urethrotomy meision, and that, as I said in the earlier part of my remarks, the criticism directed against this operation because of the destruction of the ejaculatory ducts which it has been implied was necessarily involved in its performance is not sustained I would add that there was no effort made especially to preserve the ducts when the operation was being done

The other point to which I shall again refer is that the outer fibrous sheath and the bladder wall covering the intra vesical parts of the enlarged gland are nowhere injured

Figs 12 and 13 present another view of the same specimen as the last one. The cut through the vesical orifice which was made in order to display the interior of the prostatic chamber in the last figure has been brought together again by suture, so that we are now looking directly down upon the inner surface of the part of the bladder which immediately surrounds the vesical outlet, the rest of the bladder having been cut away. In Fig 12 the prostate has been replaced in its chamber, and the middle lobe is seen projecting from the vesical orifice.

into the interior of the viscus in a manner similar to that which existed prior to operation.

Fig. 13 is the same, except for the fact that the gland has once more been withdrawn, and the condition presented is now that which actually existed after the operation. The only change or sign of disturbance of the natural structure of the bladder wall or outlet is that of a slight enlargement of the latter, which is little, if at all, greater than what is produced by the stretching of it due to the passage of the finger and the withdrawal of the middle lobe through it. (The masses which depend from the lower side of the specimen are the seminal vesicles and parts of the vasa deferentia. The bladder wall stands in front of and conceals from view the chamber from which the enlarged gland has been removed.) The point that is especially well shown in this figure is the absence of injury done by the operation to the bladder.

Figs. 14 and 15 present an unusual variety of a frequently seen condition of the bladder secondary to the enlargement of the gland, unusual in that instead of the trabeculation or single diverticula such as are commonly found, there is in this case a four-chambered diverticulum, the different compartments of which unite upon the inner surface of the bladder into one mouth, and they divide into four, one opening into each of the pouches. The individual spaces were completely shut off one from the other by well-marked septa which extended from the mucous membrane upon the surface to the further limit of the chambers. On the right upper side of the figure is the orifice of a single diverticulum which was also present, and was somewhat larger in its capacity than all four of the other chambers taken together.

Fig. 14 represents that part of the bladder which was cut away from the part immediately surrounding the vesical outlet shown in the two preceding figures; the front surface has been cut through longitudinally and we are looking into the interior of the organ. The diverticula in this case were at the summit of the organ.

Fig. 15 is the same specimen turned over so that its



FG 14 Inner surfa e of he badder showing he mon he of the dient cula opening in o



Fig. 15—Same specimen turned over to show the opposite side. The posterior aspect of the diverticula have been cut across in order to expose the interior of the chambers and to show the septa dividing those on the right

exterior or outer surface is shown. The chambers of the diverticula have been cut across in order to show their inner aspects and the septa which separate the individual cavities of the four compartments which are grouped together. None of the pouches contained calcul. The capacity of the pouches altogether, when they had lost the elasticity of the walls, and when they were not distended, was forty cubic centimetres. During life they would probably have contained not less than five ounces when distended.

My personal connection with this subject dates back seventeen years, at which time I published a monograph which embodied my beliefs with regard to the operative treatment of the hypertroplued prostate, from which publication I ask leave to quote a few of the more important conclusions, as follows

- I That the mortality attending the catheter treatment use even then greater, except in the class of peaple of the best sacial status, than that attending prostatectomy, and that the mortality of perineal prostatectomy, were it practised at a sufficiently early stage of the progress of the malady, would certainly prove to be far less than that associated with the catheter treatment, in all classes of persons
- 2 That in the large majority of cases the prostate was readily accessible and easily to be removed through the perineum
- 3 That in a minority of cases it was not thus accessible, but was readily so through the suprapulic route
- 4 That the mortality of the perineal prostatectomy was less than that of the suprapulic operation, that the former therefore became, in all cases in which it was applicable, the operation of choice, and that the best way to determine whether any individual case was or was not suitable for the perineal operation was to make a digital exploration of the actual conditions present through the posterior urethra by means of an ordinary external perineal urethrotomy incision, as the first step of the operation. That at least twice out of three times the gland would be found to be readily removable by the

perineal urethral incision, just mentioned, and that in the other third of the cases the surgeon would proceed to go on to do a suprapubic operation at once, the perineal urethrotomy exploratory incision not only not interfering with its performance, but, on the contrary, aiding in it, and also supplying additional drainage afterwards.

It will be seen therefore that my chief contribution to the subject of operative treatment was the demonstration of the fact that perineal prostatectomy through an ordinary external perineal urethrotomy incision was readily to be accomplished in a large majority of cases, and that it was the operation of choice because of its lower mortality, but not the exclusively to be adhered to operation, the suprapubic method having a very definite and distinctly advantageous place, which was, however, in a minority of the whole number. These opinions I have never seen reason to alter, and they are those which are to-day generally accepted.

I have been led to make this reference to my own share in the matter largely because of being the first advocate of perineal prostatectomy in the manner proposed by Gouley in this country.

These views were then, however, regarded as being so radical that they received little, if any, attention. It has taken a good many years for even the specialists to awake to their truth; but it is correspondingly satisfactory to have these statements that I have given above, and which were those which I urged seventeen years ago, finally receive such a wide endorsement as they have had in the course of the last three or four years, and especially to see perineal prostatectomy become so fully accepted as it has been in France and America, though under a multiplicity of what might almost in some instances be termed mannerisms rather than methods.

In conclusion, I would suggest that perhaps the most valuable contribution that could be made at the present time to the subject would be to have reported the cases treated by the catheter throughout, with special reference to the mortality and the time which elapsed between the beginning of

the catheter treatment and death in the cases in which death was obviously referable to the secondary results of prostatic hypertrophy, and the catheter treatment, or in which, at any rate, that treatment failed to avert the fatal termination, for in no other way, I think, will the conviction be so forcibly brought home to the profession at large of the dangers attending the catheter treatment or contrast them so strikingly with the benefits that the operative treatment is capable of offering, as might be done in this way, and the general practitioner be induced to transfer these cases at an early period of the malady to the surgeon for operation. What results may be looked for if this be done has been amply established by the brilliant series

of operations reported by Goodfellow, Young, Albarran, and

others

THE QUESTION OF PRIORITY IN THE ADOPTION OF THE METHOD OF TOTAL ENUCLEATION, SUPRAPUBICALLY, OF THE HYPERTROPHIED PROSTATE.

BY EUGENE FULLER, M.D.,

OF NEW YORK CITY,

Attending Surgeon to the City and to the Postgraduate Hospitals.

RECENTLY, while performing a suprapubic prostatectomy, a doctor in the audience remarked that I did the Freyer operation. I corrected him with the statement that I was performing the operation which I devised and first practised in 1894 and published in 1895, the same operation that Freyer first performed in 1900 after being acquainted with the details of my operation by a New York surgeon, a friend of mine, who had modified my procedure slightly, and that Freyer in 1901 had published the operation as his own without making any mention of me or of Dr. Ramon Guiteras, the New York surgeon alluded to.

A short time after the preceding occurrence, Dr. J. William White, of Philadelphia, sent me a reprint of his article which appeared in the December, 1904, number of the Annals OF SURGERY, entitled "The Present Position of the Surgery of the Hypertrophied Prostate." In this article I was struck by the following statement: "Largely through the work of one surgeon, Mr. P. J. Freyer, suprapubic enucleation of the entire gland has during the last decade become the operation of choice in the majority of cases." Dr. White made no mention of any prior work in this connection. I knew that Dr. White, at the time when I brought out my operation, was very much preoccupied with the idea that he had solved the troublesome problem of relieving urinary obstruction from prostatic hypertrophy through castration, and was apparently taking little interest in surgery directly connected with the gland itself. Consequently, I felt that there might be an

element of excuse in the omission, as Freyer published his article shortly after the profession at large had wholly aban doned the White procedure, and when its author's interest in prostatectomy was reviving. Other occurrences similar to these have made it evident to me that the profession as a whole is not familiar with the status of this question or with the controversy in the British Medical Journal which followed the publication of Freyer's article. It is on this account, and also at the solicitation of friends, that I have prepared this paper.

The original description of my operation was published in the Journal of Cutaneous and Genito Urmory Diseases, New York, June, 1895, in an article entitled "Six Successful and Successive Cases of Prostatectomy"

The account of the operation is as follows

"The patient is placed flat on his back, neither the Tren delenburg position nor the Petersen bag being commonly found necessary." The bladder is carefully washed out, and then left moderately distended to the extent of from eight to twelve ounces The next step is to open the bladder suprapubically the general directions which had been laid down by Keyes being followed The forefinger of the left hand is then introduced into the blad der, the location and extent of the prostatic obstruction deter mined, and the vesical opening of the urethra located. In the right hand is grasped a pair of rough, serrated edged scissors with a long handle These seissors are slipped along the left forefinger to the urethral opening, and are made to cut through the bladder wall in that region The cut extends from the lower margin of the internal vesical opening of the urethra backward for an inch to an inch and a half. The blades of the scissors, being rough and serrated, make an incision which bleeds but little Then one of the forefingers, whichever the operator may find the more convenient, is slipped through the vesical hole made by the serrated seissors, while at the same time the fist of the other hand makes firm counterpressure against the perineum By means of this counterpressure the prostatic growth is brought well into the reach of the forefinger of the other hand, which is employed all this time in enucleating the prostatic obstruction

en masse, or piece by piece, as the case may be. This enucleation can be easily and speedily accomplished in this manner, and should not be desisted in until all the lateral and median hypertrophies, as well as all hypertrophies along the line of the prostatic urethra, have been removed. The vesical walls at the base, as elsewhere, are very elastic and dilatable, so that it will be found that the little cut made through the bottom of the bladder will be large enough to admit of the passage through it of the enucleated prostate.

"Figs. I and 2 accompanying this article are natural-sized illustrations of prostatic hypertrophies which I have enucleated in the manner described. In Fig. I the whole hypertrophy was removed in one piece, while in Fig. 2 the obstruction came away in three pieces, representing two lateral and a median hypertrophy. . . . A perineal section is then made, and a large size (twenty-six American) soft rubber tube is passed through the perineal cut, and the cut through which the prostate was enucleated, into the bladder. After this, hot-water irrigation is employed for some minutes to wash out blood-clot and to stop oozing. Then the suprapubic wound is closed by a deep layer of catgut sutures which include the bladder wall, and by a more superficial layer of silkworm-gut (Florentine) sutures. About in the middle of the cut the catgut stitch is omitted and a deep Florentine gut suture is taken, which includes the vesical walls and the whole extent of the lateral abdominal walls. This suture, howwhole extent of the lateral abdominal walls. This suture, however, is not tied at the time of operation, thus allowing a rubber suprapubic drainage-tube to temporarily remain in position. At the end of four or five days, however, this suprapubic drain may in most instances be removed; then this last Florentine ligature can be tied, thus entirely closing the suprapubic cut. It is best not to remove these Florentine sutures till after the patient is up

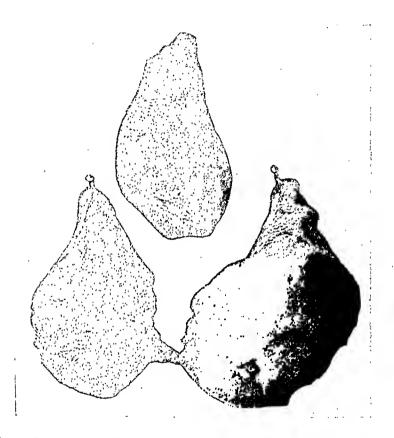
not to remove these Florentine sutures till after the patient is up and about, as without their firm support there is oftentimes a tendency for the soft scar tissue of the wound to give, thus allowing a considerable spreading of the abdominal structure.

"My method of enucleating the prostate through a small hole made in the base of the bladder is accomplished by a technique almost the opposite of that advocated by Nicoll, of Glasgow, in the Lancet, April 14, 1894, and by Alexander, of New York, independently of Nicoll, at the May (1894) meeting of the American Genito-Urinary Association. These gentlemen enu-



Fig. 1—Dr. Fuller's specimens of prostatic hypertrophy removed by enuclection (natural size). So wang the enime hypertrophy enuclected in one piece.

(A sepression of the cots which appeared in De Luller's original artifets the Journal of Cataneous and Centes-Urinary (Deases, June 1895)



 $F_{1G.\ 2.}$ —Showing the hypertrophy enucleated in three pieces, two lateral and a median.

cleate the prostate through a spacious perineal wound, that gland being brought into the reach of the perineal finger by the pressure extended downward and forward by the finger of fingers of the other hand introduced into the bladder through a suprapuble incision. Then after such enucleation a dependent incision is made into the bladder and perineal drainage established. My first case of enucleation by my method was performed early in May, 1894, before I was aware of Nicoll's publication, and before Alexander had also reported that method. I can say of my method of enucleation that by it the prostate hypertrophy can be easily and thoroughly removed without damage to the structures composing the vesical neck, and that hamorrhage resulting from it has always been of little consequence. Owing to the slight amount of bleeding, I have always found it feasible to sew up as I have described the suprapible cut, and have never experienced trouble from secondary hamorrhage."

In speaking of results, I have this to say

"In almost all cases also the use of the catheter can be entirely dispensed with after convalescence from the operation is wholly established, the apparently atomed bladder gradually regaining its muscular force until finally it throws off a full forcible stream. In many instances previous evidences of renal trouble, due to pyclitis caused by dilatation of ureters and pelves, gradually disappear as these muscular structures also in like manner as the bladder regain their tone. As a result of all these changes and regenerations, the patient at the end of six months or a year after the operation is apit to report hale and hearty, declaring that he feels ten years younger, and that his act of urination is all that he could desire. I am well aware that many surgeons will consider that the foregoing statement in favor of the radical removal of the obstruction is too rose-colored, and will point to the indifferent results obtained in many instances by earlier operators to sustain their opinions. I, however, hold that the argument against prostatectomy on the ground that the results to be expected from it are indefinite and unsatisfactory is a false one, and that it is based on cases where the removal of the hypertrophy at the time of the operation was incomplete. In many of the earlier insatisfactory cases the object of the operator was

simply to chisel out, as it were, a canal through the obstruction at the vesical base connecting the post-prostatic vesical cul-de-sac with the membranous urethra, no attempt being made to remove lateral obstructions or the rigid hypertrophies surrounding the prostatic urethra. If, however, all the hypertrophies—median, lateral, and round about the prostatic urethra—are removed, as they should be, and as they can be by adopting the method I advocate, then I claim that the results, as far as the bladder is concerned, are, barring mortality, satisfactory."

In the spring of 1900, my book, "Diseases of the Genito-Urinary System," The Macmillan Company, New York, was published. In this book, which appeared before Freyer's article on operative work, I incorporated my 1895 paper just quoted.

In August, 1900, Dr. Ramon Guiteras, of New York, read his paper, "The Present Status of the Treatment of Prostatic Hypertrophy in the United States," before the Paris meeting of the International Medical Congress, in which he announced his modification of my suprapubic prostatectomy. In my operation, while one hand is engaged in enucleating the prostate, the fist of the other hand makes firm counterpressure against the perineum. In Guiteras's modification, one or two fingers are introduced into the rectum to make upward counterpressure against the prostate itself while the suprapubic enucleation is being accomplished. Dr. Guiteras's paper appeared in the New York Medical Journal, December 8, 1900. Dr. Guiteras, on his way to Paris to attend this meeting of the International Medical Congress, stopped in London, and while there called on Mr. P. J. Freyer at St. Peter's Hospital, and fully instructed and acquainted him with my operation, as well as with his own modification. In substantiation of these statements, I submit this copy of a letter written me by Dr. Guiteras:

February 5, 1905.

EUGENE FULLER, M.D.,

Lexington Avenue and Thirty-fifth Street, City.

DEAR DOCTOR,—I read a paper entitled "The Present Status of the Treatment of Prostatic Hypertrophy in the United States" in the Section of Urinary Surgery of the International Medical Congress in Paris,

August 4, 1900 In this paper I explained the different methods that are employed in operating on the prostate gland in this country. An abstract of this paper was published in the transactions, but the paper in full came out in the New York Medical Journal December 8, 1900. I had the pleasure of meeting Dr. Freyer in London on my way to Paris, and explained to him your method of enucleating the prostate that you had been using for a number of years, and which I had been following, with the exception of introducing my fingers into the rectum for the counter pressure instead of pressing upon the perineum. Dr. Freyer was very much pleased with the description of the operations and said that he would try the method. Since then he has operated a number of times, but describes his operations as though he had originated the operation of suprapulue prostatectomy which had been performed for so many years previously by other operators. I am sending you the reprint of the Paris paper.

Yours sincerely,
(Signed) Ramon Gutteras

Freyer's first case of suprapubic prostatectomy entered St Peter's Hospital on November 21, 1900, shortly after Dr Guiteras's instructive visit, and Freyer, showing himself an apt student, operated successfully, following the exact method taught him by the New York surgeon

On June 26, 1901, Mr P J Freyer delivered a clinical lecture on total extrepation of the prostate for radical cure of enlargement of that organ before The Medical Graduates' College, London This lecture appeared in the British Medical Journal of July 20, 1901 After some opening remarks, he states "I have in four cases undertaken a new and, at first sight, a very formidable operation for radical cure of the enlarged organ, namely, total extirpation of the prostate in one and all with entire success. These four operations have completely revolutionized my views with regard to the treatment of this painful and widespread malady, and I submit that the complete success with which they have been attended opens up a new and promising era in this field of surgery with far-reaching results" Then follows the surgical recital of the four cases, in all of which my method with Dr Guiteras's modification was carefully followed. But nowhere was the operation described as other than new and original with the writer of the article

Mr. Freyer's assumption of almost everything in sight in connection with prostatectomy was too much for English surgeons generally. Very many letters were promptly sent to the *British Medical Journal*, most of them in violent protest; and a prominent London surgeon, in a spirit friendly to me, quickly sent me a marked copy of the article, which enabled me also to embrace the opportunity, which would otherwise have been lost, to enter my protest with the rest. It is impossible here to detail all these letters, but any one interested can read them by examining the files of that journal. I will, however, quote from the letters bearing directly on the point at issue.

Mr. A. W. Mayo Robson, of Leeds, published his first letter in the *British Medical Journal* of July 27, 1901, protesting somewhat generally at Mr. Fryer's claims, and also because no mention had been made of his own extensive work. Mr. Freyer replied rather acrimoniously to Mr. Robson in the *British Medical Journal* of August 3, 1901, but admitted nothing.

Mr. Robson, in answer in the British Medical Journal of August 10, 1901, had this to say:

"Even if Mr. Freyer does not acknowledge that McGill enucleated the hypertrophied prostate, the operation said by Mr. Freyer to be original was described by Dr. Fuller in the Journal of Cutaneous and Genito-Urinary Diseases, Vol. viii, 1895, page 232, and on page 233 are shown drawings of prostates removed by enucleation which are very much like the drawings shown in Mr. Freyer's paper. A series of cases is also given at the end of the paper. This book can be seen in the library of the Royal Medical and Chirurgical Society. The operation is further described on page 415 of Dr. Eugene Fuller's work on "Diseases of the Genito-Urinary System," The Macmillan Company, of New York, 1900, where occurs the following passage."

Mr. Robson then quotes the steps in my operation, but, as these already occur earlier in this article, it is not necessary to reiterate them. Mr. Robson concludes his reference to me with the remark, "Moreover, Dr. Füller's cases referred to above were completely cured."

Mr. Freyer, in answer to the preceding letter of Mr.

TOTAL ENUCLEATION OF HYPERTROPHIED PROSTATE. 527

Robson has this to say, regarding my work, in the British Medical Journal of August 17, 1901

The communication of Fuller referred to I regard as a valuable contribution to the surgery of the prostate. It exemplifies a higher step in the evolution of the operation of MeGill and Belfield. But his operation is purely a partial prostatectomy the obstructing nodices being removed from within the capsule sometimes by the finger, at others by cutting forceps and seasors of which a variety is figured. The prostate urethra is out into a perincal section performed for dranage and counter pressure made by hand on the perincum whereas in my operation cutting forceps and seasors are dispensed with and by the finger point alone aided by a finger in the rectum for counterpressure the whole prostate is enucleated in its capsule and stripped off the urethra which is left undouched in the manner explained in my lecture thus obviating severe bleeding and securing permanent immunity from recurrence of the disease. No centual section is done in my operation.

This comment of Freyer on my work, the only one as far as I am aware that he ever made, is largely false or skil fully misleading. In the first place, as I remove the entire hypertrophy, and so distinctly state, Freyer draws a false conclusion in referring to my operation as a partial prostatectomy. It is also a false assumption on his part when he states that I only remove nodules within the capsule. I remove the same amount of capsule and the same amount of hypertrophy that he removes, as can be seen in the pictures in my article. I do not however, assume in my article that the capsule I remove is the capsule proper of the prostate. I purposely left that question open as one for anatomists or histologists to decide. I have always been taught, when I remove a neoplasm not to attempt to announce its exact nature at the time, but to turn it over to a pathologist for his opinion.

Freyer, however, in his characteristic manner, announces the fibrous structure covering the prostatic masses removed by enucleation to be the true fibrous sheath of the prostate, thereby getting himself into trouble with the anatomists and the his tologists, and, because I did not make a like injudicious announcement, he tries to argue that my operation is partial He also states that I accomplish removal "sometimes by the

finger, at others by cutting-forceps and scissors, of which a variety is figured." This is also another misleading statement. In my 1895 article, where I describe my operation, no instruments are figured. In my book on "Diseases of the Genito-Urinary System," where all operations on that part are described, there are, of course, cuts of various instruments. my 1895 article, one only out of the six operations I had then performed was not amenable to my enucleation operation, and in that I had to use scissors and cutting-forceps. Freyer's attempt to argue from that fact that he did not wrongfully appropriate my operation as his own is hard to follow. All prostatic enlargements cannot be removed by enucleation, although the great majority can be. Any honest operator of experience will admit that. The only use I make of scissors in my enucleation operation is to cut through the base of the bladder exactly as Freyer, copying me, uses those instruments. All the rest of the operation of removal is accomplished by my finger-end alone, just as Freyer, copying me, uses his. In my operation, none of the urethra or bladder wall is removed, all being left just as in Freyer's imitation procedure. ment, however, that he leaves the urethra untouched is so made as to allow the false inference that in my operation it is removed. My making a perineal puncture for drainage in the after-treatment is one special detail in which Freyer does not follow me, and that has nothing really to do with the operation, being merely a feature of the after-treatment. The other point that he emphasizes in which he differs from me is that I make counterpressure by a hand on the perineum, whereas he introduces a finger into the rectum for counterpressure. That is the feature wherein Dr. Guiteras's operation differs from mine, and, as Dr. Guiteras instructed Freyer in this particular, it is more natural that he should, in trying the operation, appropriate that gentleman's modification rather than my original procedure.

Mr. Robson, British Medical Journal, August 24, 1901, has this to say in answer to Mr. Freyer's previously quoted allusion to my work:

TOTAL ENUCLEATION OF HYPERTROPHIED PROSTATE. 529

Mr Freyer, by raising side issues, attempts to divert attention from the chief points in the controversy. I hold that Mr Freyer has not substantiated his claim to having performed an original operation, and that, had he been acquainted with the literature of the subject and with the work of others, he would never have made such a claim.

My own reply to Freyer's original article of July 20 appeared in the British Medical Journal, August 24, 1901 It was as follows

'I was much interested in Mr Freyer's article on total extirpation of the prostate which appeared in the British Medical Journal of July 20 On first glancing it over, I thought that Mr Freyer was announcing himself as one of my disciples, so closely did he follow in my footsteps. But on closer reading I failed to find any acknowledgment of my tutelage" I then give the references to my work on the subject and close with the statement, 'I think you will find in my method of prostatic enceleation practically everything to which Mr Freyer now lays claim"

When I wrote this letter, I knew nothing of Dr Guiteras's personal experience with Mr Freyer It was only recently, when I began to investigate the date of Guiteras's modification of my procedure in order to determine if it did not have precedence over Freyer's work, that Dr Guiteras's connection in this matter came to my notice Of course, if I had known then what I know now, my letter would have been framed very much more strongly than the one I wrote

On the appearance of Mr Freyer's first article, Mr Keegan promptly wrote a congratulatory letter to the British Medical Journal, August 3, 1901, in which he states

The chinical lecture on total extirpation of the prostate for radical cure of enlargement of that organ delivered by Mr P J Freyer at the Medical Graduates' College London on June 26 and reported in the British Medical Journal of July 20 heralds a new and most promising epoch in operative surgery, and is in my opinion one of the most valuable and important clinical lectures published for many years. It will doubt

less receive in the editorial columns of this journal the prominence it so richly merits; and I venture to state that I voice the opinion of the Indian Medical Service when I say that we, one and all, feel proud that it should have fallen to the lot of a member of our service to have made this great and important advance in the surgical treatment of enlargement of the prostate."

This certainly was a very handsome compliment. Every one knows Mr. Keegan's work on litholapaxy, and especially his discovery of the fact that litholapaxy in connection with boys, and even with very young male children, is not only possible, but a very safe operation in skilled hands.

His brilliant accomplishments, however, have been performed in India, where prostatic hypertrophy is seen very rarely, and then not in connection apparently with the native population. Accordingly, it is natural that he should not have been in close touch with the literature of the prostate when he wrote this congratulatory letter.

When my letter appeared, however, in the *Journal* in reply to Mr. Freyer, Mr. Keegan got my work, and, after reading it, wrote the following to the *British Medical Journal*, October 26, 1901.

"In modification of the letter which appeared above my name in the British Medical Journal of August 3, I would like to say that, having now read Dr. Eugene Fuller's work, 'Diseases of the Genito-Urinary System' (New York, 1900), I am of the opinion that in his operation designated the 'direct surgical removal of prostatic obstruction,' Dr. Fuller had in principle anticipated by some years Mr. P. J. Freyer."

Besides this letter to the British Medical Journal, Mr. Keegan was so polite as to write me a personal letter under the date of October 28, 1901, in which he states: "Having had the advantage of reading your work on 'Diseases of the Genito-Urinary System,' I wrote a short letter to the British Medical Journal which appears in this week's issue, and I trust you will consider that, though somewhat late in the day, I have accorded you your just due for being the first to deal in a rational and scientific manner with enlargement of the prostate."

TOTAL ENUCLEATION OF HYPERTROPHIED PROSTATE. 531

Mr Keegan's withdrawal of his credit for the operation under discussion from Mr Freyer and his transfer of it to me would not have been done, I think all will acknowledge, hid not my work, in his opinion, warranted it beyond all question. From his long association with Mr Freyer, and from the tone of his congratulatory letter, it is fair to suppose that he would have had primarily a special disposition to favor the claim of his former associate in the Indian service.

Dr White, in his article previously referred to in describing Mr Freyer's present operative technique, speaks of his scratching through the vesical structure covering the prostatic hypertrophy Mr Freyer's former procedure, and the one I employ, is to cut through with scissors. I am prejudiced against scratching. As a boy, I was taught to strike out from the shoulder, and that scratching was a feminine method of fighting. In surgery, a scratch makes a nasty wound in comparison with a cut. I think Mr Freyer would do better, should he continue, to cut through rather than to scratch through the vesical wall covering the prostate. But if he wishes to claim to be the original scratcher in connection with suprapubic prostatectomy. I certainly will not protest against that his only valid claim.

As I have been performing prostatectomy steadily and

As I have been performing prostatetomy steadily and continuously for the past eleven years, my personal experience is now large. When I prepared the paper I read at the last June meeting of the American Medical Association, I found, on looking over my records, that my operative cases in all were slightly in excess of 300. Since that time I have operated on seventeen more cases without a death. I think I am safe in stating that I have performed prostatectomy more times than any other operator. Largely, I suppose, because I found my suprapubic operation most satisfactory, and consequently never lost time digressing from it to try castration, the Bottin operation, or any other of the various surgical makeshifts which have come and gone during the years I have been operating. I do not wish, however, to be considered as classing perineal prostatectomy among the surgical makeshifts. I em-

ploy that operation now in perhaps one-third of my cases, my technique being very similar to that observed by Goodfellow. The question of choice in a given case between suprapubic and perineal prostatectomy I consider an important one; but I will not touch upon it in this connection, as I have very recently discussed that topic in my paper entitled, "Prostatectomy: Is it Wise to try to make any One Operative Method apply to All Cases?" (Journal of the American Medical Association, November 12, 1904.)

I find that many of the recent articles on prostatectomy deal more with the question of mortality than with that of results. Both are of course equally important. As far as the mortality is concerned, it is surprisingly small at the hands of a skilled operator, considering the age of the patients and the seriousness of the disease. For the last two years I have been operating with a mortality under 4 per cent. in connection with patients of the better class, who have been able to provide themselves with the luxuries of special nursing and extras in the way of diet. Among charity cases, many of them destitute, my mortality is about 11/2 to 21/2 per cent. higher. Such individuals are apt to be suffering from malnutrition and the effects of exposure and neglect when operated upon, and consequently average worse risks. Special nurses and attentions also count much with aged individuals, as with children, and when such luxuries cannot be had, it is natural that the percentage of recoveries is somewhat lowered. I do not think it right for an operator in this branch of surgery to try to keep his percentage of mortality small by rejecting what seem to be the bad risks, or, in other words, to leave the bad risks to die in agony where, were it not for the fear of injuring his mortality statistics, he would have operated, thus ridding a patient of his suffering through the removal of the obstruction to urine drainage; the result being, even though death did

finally ensue, a peaceful and placid ending.

My results are so nearly uniformly satisfactory and perfect, that it is my custom to assure a patient that after recovering from the operation he will be able to urinate naturally,

TOTAL ENUCLEATION OF HYPERTROPHIED PROSTATE. 533

and at normal intervals will be able to empty his bladder completely, and that his urine will become free from pus and bac teria. As for a patient's sexual status after the operation, I do not consider it safe to be so positive, for a fair percentage of these elderly individuals have already lost that function through senility or through old inflammatory lesions in connection with the seminal vesicles Prostatectomy will not restore potency in such cases In a considerable number of those individuals who have lost their sexual force, the cause lies in the fact that the prostatic hypertrophy by its direct pressure on the seminal vesicles has caused atonic distention of those organs, the result being impotency In such instances the removal of the hypertrophy will restore the sexual function In a number of my operative cases representative of such a condition, satisfactory marriages have resulted the year after operation If a patient still has sexual force before operation, in my experience prostatectomy ought not to injure the function, while in many instances it ought to improve it. I have never as yet been so unfortunate as to tear through the rectal wall in the performance of prostatectomy. I fear, however, that such an accident is not unusual. A layman a short time ago informed me that a friend of his who had had his prostate removed suffered considerably from the fact that much of his urine came away through the rectum, a common result of the operation, so he had been told In a small percentage of cases, phosphatic stone may form in the granular area, from which the prostate was removed, and in a few instances in the convalescent period after prostatectomy I have had to perform htholpaxy I have had but two cases which could not urinate satisfactorily after the convalescent period. In one of these tubercular pericystitis existed as a complication accounting for the failure of the bladder to regain its function In the second case, owing to a ventral herma left by a preceding operator who had opened the bladder suprapubically for stone, I was forced from doing a suprapubic prostatectomy, and had to perform the perineal operation, though I considered that operation contraindicated In this case, however, the

patient largely recovered his vesical function. Although dribbling of urine and perhaps inability to voluntarily hold the vesical contents are not unusual for a few months after the operation, I have but one case where that condition has persisted. In that individual, a man of seventy-five years, from whom I removed a prostate, the central portions of which had liquified in areas through fatty degeneration, the power to hold his urine on exertion has never returned. While in bed he can, however, control himself. On a very few occasions I have had some trouble in closing suprapubic fistulæ, but have always succeeded in rebellious cases by resort to a slight plastic operation. I have no record of an instance wherein one of my cases has been left with a perineal fistula or with a rectovesical fistula.

THE TREATMENT OF PROSTATIC HYPERTROPHY BY ENUCLEATION THROUGH A SUPRAPUBIC INCISION 1

BY HOWARD LILIENTHAL, MD,

OF NEW YORK

Attend ng Surgeon to Mt. Sinal Hospital

TROM experience in thirty one cases in my service at Mt. Sinai Hospital, I believe that the suprapubic is the safest and most thorough of all the operations for the relief of prostatic obstruction Twenty of these cases are my own and eleven were operated upon by my adjunct, Dr Joseph Wiener Another case seen some years ago and the only one not operated upon in the hospital, resulted fatally The patient was uraemic and aphasic before the operation, and died of uramin three days afterwards. Perhaps a cystotomy with secondary prostatectomy might have saved him. I have since employed this two stage method to my great satisfaction, and I believe it to be one of the important advantages of the suprapubic opera tion Operative recovery has occurred in every case of the thirty one treated in the hospital, and perfect functional recovery in all except two, and even these two patients urinate without the use of the eatheter. In one there is weakness of the splineter, so that the man can hold only about three ounces of urine at a time. The other patient has a residual of from ten to 100 cubic centimetres which I hope will disappear, especially as the suprapubic wound has been closed only about three months. He does not use the catheter and is apparently a well One old man operated upon at the age of eighty died some months later of an intercurrent disease. All the other patients, of ages varying between fifty and eighty five at the time of operation, were functionally cured. My first patient

^{&#}x27;Read at the meeting of the New York State Medical Society held in Albany Tebruary 1 1905

died a few days ago of cardiac disease after nearly five years of perfect relief from prostatism.

Sexual power was increased after the operation in a number of instances; it was lost in none who were potent before. Great impairment occurred in one of my more recent cases. The patient, however, is a neurasthenic individual, and, judging by his symptoms, I am convinced that his impotency is of a functional nature, and I hope that the power will be restored. He is fifty years of age.

Most of the patients were feeble and many had renal disease and cardiac weakness; several had vesical calculi; two were diabetic; one was a sufferer from tabes, and after the failure of a Bottini's operation it was thought that the vesical disorder might be of nervous origin. He was promptly cured by suprapubic prostatectomy.

In view of such a record, it is but natural that I should prefer the operation which has made it possible.

I will briefly give the steps of the procedure, believing that, if carefully followed, success will be as certain in the hands of others as in my own.

There should be about two days of preparation. If there is cystitis, the bladder should be emptied by catheter every three hours day and night. Irrigation, unless there is a large amount of mucus, is not necessary. As an internal urinary antiseptic, I prefer salol in five-grain doses taken three times a day. Urotropin may be given when the wound is healed or well advanced in granulation. A little cardiac stimulation is usually wise, and the kidneys should be well flushed by copious draughts of water.

The patient being on the table, a catheter is passed into the bladder, and when the viscus is empty, a rubber atomizer bulb is attached to the catheter. The anæsthetic is then administered. In most cases nitrous oxide may be used in the beginning, and will frequently carry the patient safely through the operation. If unexpected difficulties arise, it may be followed by ether. A sagittal incision two or two and one-half inches long is made in or near the median line and the recti

retracted The ungloved finger of the operator is inserted between the muscles, and the bladder inflated by the rubber bulb in the hands of an assistant until the viscus feels tense on digital palpation The peritoneal reflection is now pushed up out of the way with the handle of the scalpel and held there with a blunt retractor Two silk traction sutures are deeply placed in the vesical wall. Between these sutures the bladder is punctured with a narrow bladed knife, and the opening thus made enlarged by stretching with dressing forceps. Thus far from one to two minutes have probably been consumed without hurry and with no appearance of haste. The bladder is now explored by the finger, stones if present, are removed, and the prostate is carefully palpated. An assistant inserts his finger into the rectum, pushing up the prostate so that it may be erught firmly with volsella. An incision is then made with scissors into the substance of the prostate through its capsule and enucleation performed with the aid of two fingers. This should be done deliberately, freeing first the posterior part of the organ and being guided by the assistant's finger in the rectum If it is desired to examine the work by the eye the patient may be placed in Trendelenburg's position, when blunt retractors or a bivalve speculum will expose the field

It is neither necessary nor wise to work so roughly as to wilse the prostatic urethra, which has been done purposely by some operators. For the last two years I have had each specimen examined by the pathologist for urethral mucous membrane, but none has ever been found.

Thorough flushing of the bladder with hot saline solution is followed by the picking of the prostitic portion of the wound with gauze. This may be done with the finger or through a large endoscope or proctoscope inserted into the wound. If hemorrhage has been unexpectedly free, a few strips of gruze may be placed in the bladder to encourage coagulation. Perineal drumage is unnecessary. The patient, who his probably lost very little blood during the ten or twenty minutes of the operation, is put to bed with a sand bag over the pubes. In forty eight hours the gauze may be removed,

a tube inserted and permanent siphonage instituted, the long arm of the siphon being kept full by a slow stream from a large irrigating bottle. The patient is thus kept dry and quite comfortable. If he is very feeble, so that there is danger of pulmonary hypostasis, it is best to get him out of bed as early as the second or third day.

It is rarely necessary to pass the catheter during the convalescence, but the bladder should be frequently flushed out through the siphon-tube. I usually remove this tube before two weeks have elapsed, and the patient soon begins to urinate through the natural channel. The shortest stay of any patient in the hospital was two weeks and the average about four and one-half weeks.

An enumeration of some of the advantages of this operation follows:

It is radical; no important vessels or nerves are cut; the urethra is not injured. Wounding of the rectum must be extremely rare. I have never seen the accident, although wounding of the rectum in the perineal operation must be a not infrequent complication if one may judge by the number of published reports of this deplorable accident. Palpation and inspection of all parts of the interior of the bladder are easy and accurate, and one may thus gain, as in no other way, a perfect understanding of the mechanical conditions which cause the obstruction. Having decided upon suprapubic section, there is no need for pre-operative cystoscopy; in other operations upon the prostate cystoscopy is practically a necessity. There is an almost total absence of shock, and the patient may be out of bed in forty-eight hours. No part of the urethra having been removed, treatment by the passing of sounds is Drainage is procured by siphonage and without perineal counteropening. The operation may be easily performed under nitrous oxide anæsthesia. The operation may be performed in two stages, which may be of enormous value in hæmorrhage, in uræmia, or in grave sepsis of the bladder when catheterization is difficult or painful or dangerous. Speed is a most important element in the surgery of the aged, and

539

the method here described is by far the quickest of those recommended for the relief of prostatism Lastly, but far from least, impotency rarely supervenes

Great care and watchfulness are necessary during the

course of the after-treatment if the case is to run smoothly The operation itself is so simple that any surgeon who masters the details as here described can hardly fail of success

SUPRAPUBIC PROSTATECTOMY WITHOUT ETHER OR CHLOROFORM.¹

BY USE OF NITROUS OXIDE GAS ANÆSTHESIA.

BY JOSEPH WIENER, JR., M.D.,

OF NEW YORK,

Adjunct Attending Surgeon to Mount Sinai Hospital.

By removing the prostate gland through a suprapubic incision under nitrous oxide gas in a few minutes, we are enabled to-day to cure many patients who only a few years ago would have been looked upon as incurable. Suprapubic prostatectomy under nitrous oxide gas can be safely undertaken in the most desperate cases. Neither nephritis, nor cystitis, nor diabetes, nor advanced old age, are contraindications. Any man who is able to take nitrous oxide gas for ten minutes can safely have the operation performed.

We do not say that the suprapubic operation is the most desirable one in every case. But we do say, and say most emphatically, that the suprapubic operation is a safe, an easy, and a most satisfactory operation in any and every case of prostatic hypertrophy. I was told last winter that it was impossible to remove, by this method, a small, hard prostate under nitrous oxide gas in a few minutes. In Case VIII of this series, I removed a very small, hard, firmly adherent prostate in nine minutes. There is not the slightest doubt in my mind that any prostate, large or small, soft or hard, adherent or non-adherent, can be readily removed in a few minutes by the suprapubic operation. I grant that a good deal of physical strength and some experience are requisite. But, surely, neither physical strength nor experience are contraindications to the performance of any operation. In a former paper I stated that I did not know of any contraindications to the

Real tion before the Eastern Medical Society.

operation, if it were performed under nitrous oxide. Increased experience but serves to substantiate the correctness of that claim. Not only have I been fortunate enough to have lost no case, but I can truthfully say that I have never seen a severe hæmorrhage, or a bad infection, or any shock, follow the operation. Of all the numerous objections made to the operation, by those who do not perform it, there is only one worthy of consideration. The former dangers of the operation due to the anæsthetic, to hæmorrhage, to shock, to sepsis, are not worth discussing to-day, because they no longer exist. There is no severe hæmorrhage, there is no sepsis, and there is absolutely no shock following the operation under laughing gas.

It is not true that more of our cases are impotent than after the perincal operation. Most of the cases that were potent before the operation remain so after the operation. One of my patients had sexual intercourse eight weeks after his prostate had been removed. Can we ask for a more rapid return of sexual power?

The one and only objection that I have had to the operation was the length of time the wound took to heal. True it
is that the perineal wound takes just as long, but two wrongs
do not make a right. We have been devoting much thought
to the subject of shortening the time of after treatment. While
it is too early to speak definitely, I think I can say with some
assurance that in future the suprapible wound will be made
to heal in a shorter time than in the past. By a novel method
which I have under trial, I was enabled to have the bladder
wound heal in nineteen days. Moymhan, of Leeds, has recently stated that the average length of time in his cases had
been twenty-seven days. Do the sinuses heal more rapidly
after the perineal operation?

Some surgeons have declared that we ought to use the cystoscope before operation, and by the cystoscopic picture decide whether a suprapube or a perineal operation should be undertaken. If we find a large middle lobe projecting into the bladder, we are told the suprapube operation is indicated

If the lateral lobes are enlarged downward towards the perineum, then the perineal operation, we are told, is the operation of choice. Personally, I have never made a cystoscopic examination in the presence of marked prostatic hypertrophy, and I hope I never will. The cystoscope is not only an unnecessary, but often a dangerous instrument in cases of marked hypertrophy of the prostate. We can always make the diagnosis without it; the information it gives us is often incomplete and misleading, and its introduction is not rarely followed by an acute cystitis, the very complication we do not want at the time of operation. The less traumatism to the urethra and bladder before the operation, the shorter the after-treatment, and the more satisfactory the result. If possible, I avoid even passing a catheter before operation. The bladder and urethra in these cases resent all manipulation, and, until we are ready to open the bladder and drain it, our guiding principle should, we take it, be masterful inactivity.

Regarding the dangers of removing some of the prostatic urethra in doing the suprapubic operation, they are entirely theoretical. No bad results whatever have been observed. Moynihan claims that he gets better results when he removes some of the urethra with the prostate. I have done this in several cases, and have had complete cures result.

The cases I have to report are unselected consecutive cases. The youngest of the patients was fifty-four years old and the oldest eighty-two years. The average age was sixty-eight years. Most of the patients were in poor condition at the time of operation. Moreover, two of them were old diabetics, and another of them was having daily chills due to his infected bladder. Nitrous oxide gas was used exclusively in all cases. Several of the patients would probably not have made good recoveries had ether or chloroform been employed. The technique of the operation I have described in a former paper. The time of operation has varied from nineteen minutes, in one of the earlier cases, to five minutes in one of the later cases. The average length of time for the operation has been

ten minutes Most of the patients have required gas only during part of the operation

In two of the cases, V and VII, a preliminary suprapubic cystostomy was performed, and the bladder drained for some time before the prostate was removed. And that is just one of the great advantages of the operation,—that we can, in badly infected cases, or where an active hæmorrhage is going on into the bladder, first drain the bladder by a suprapubic incision, and then through the same incision remove the prostate in a few minutes. In this way even the most desperate cases can be completely cured.

Case V, an old gentleman of seventy five years, had been catheterizing himself day and night for five years, and had had repeated attacks of orchits and cystitis. When I saw him with Dr. H. S. Stark he was having a daily chill, accompanied by fever, anorexia, irregular pulse, and marked general depression. The urine withdrawn by catheter was 50 per cent pus, and the catheter had to be passed every two hours. The man was thought to be dying, and I was asked to see him, not with the idea of operating on him, but simply to satisfy the relatives. Through a suprapubic moision the bladder was opened and drained for eleven days. Then, through the same incision, under nitrous oxide gas, the entire prostate was removed in eight minutes, and the man made a splendid recovery

The other case in which I did a preliminary cystostomy was in Case VII The patient was also seventy five years old When I saw him with Dr Dinkelspiel his bladder was enor mously distended with urme and blood clots, and it could not be thoroughly empited. The general condition was none too good, accordingly I performed suprapubic cystostomy, and removed a handful of clots. Eight days fater, through the same incision, I removed the entire prostate in just two minutes. This man also made a good recovery. It is, we believe, beyond cavil that both of these patients would probably have died had a perineal operation been done under ether or chloroform. And it is in just such cases as these, where we operate in two stages, that we achieve the most brilliant results. And

it is just for the desperate cases, in which only a few years ago no operation would have been undertaken, that I would most strongly recommend the suprapubic operation. If a man is not much over sixty, and is in good general condition, a perineal operation under ether or chloroform may safely be undertaken. But if a man is over seventy and in poor condition, especially if he have nephritis or diabetes, then the suprapubic operation under gas is ideal.

Mortality.—In experienced hands suprapubic prostatectomy, especially if done under gas, must give a very small mortality. I have been fortunate, in spite of the desperate condition of some of my cases, in saving them all. Increasing experience has taught us valuable lessons both in regard to the technique of the operation and in regard to the after-treatment.

SYNOPSIS OF CASES.*

Case I.—W. N., eighty-two years old, referred by Dr. Max Rosenthal. Three weeks before I saw him for the first time, he had been suddenly seized with retention of urine. Following this attack there had been complete retention until the time of operation. High up in the rectum a large prostate could be felt.

Operation.—January 28, 1903, under gas, the entire prostate was removed through a suprapubic incision. A strip of gauze and a drainage-tube were inserted into the bladder. The time of operation was fourteen minutes. The prostate was two and a half inches in diameter, and it was traversed by the prostatic urethra. Recovery was uneventful.

Case II.—S. S., sixty-five years old, referred by Dr. R. G. Wiener. In July, 1902, the man was seized with severe pain in the region of the bladder, together with very frequent urination, accompanied by straining. The prostate was moderately enlarged and tender. Attempts at catheterization were unsuccessful, and were followed by bleeding. Following this attack there were repeated attacks of a similar nature, gradually increasing in frequency. Nocturnal dribbling of urine set in, and became a distressing symptom. In May, 1903, the prostatic enlargement had become more marked, and there were twenty-two ounces of residual urine.

^{*} For detailed account of cases, see author's former paper, Journal of American Medical Association, May 14, 1904.

Operation —May 6, 1903, under gas anæsthesia, a suprapubic prostatectomy was performed in seventeen minutes. The prostate was as large as a lemon, and was traversed by the prostatic urethra. With the exception of a slight infection around the right spermatic cord, recovery was complete and uneventful.

spermatic cord, recovery was complete and uneventful CASE III—W C, fifty seven years old, was referred to me by Dr J D Khodoff The doctor had on numerous occasions found glucose in the urnne During his stay at the hospital no glucose was found The man complained of gradually increasing pain and frequency of urnation until he had to urnate every ten or fifteen minutes during the day and four or five times at night Rectal examination revealed a moderately large prostate

Operation —July 6, 1903 under gas, a firmly adherent prostate was removed in mineteen minutes with great difficulty Owing to the fact that we did not pass sounds, a stricture of the prostatic urethra resulted, and a perineal section had to be done. This was followed by some incontinence of urine, but the man finally made a good recovery

CASE IV—S S, sixty three years old was referred to me by Dr S Breitenfeld The man had had diabetes for several years, at times as much as 15 per cent of glucose was present.

Five days before the operation on rising in the morning, the man was surprised to find that he was unable to urinate Thereafter he had to be catheterized regularly. By rectum a very large, tender prostate could be felt. The urine contained a trace of albumen, I per cent glucose and many red blood cells.

Operation—On September 4 1903 under gas, the entire prostate was removed in eight minutes. The gland was as large as an orange, soft in consistency, and the urethra ran through it near its anterior surface. Owing to the fact that the man had diabetes, the wound healed slowly. However, the man made a perfect recovery, and, although he is still suffering from diabetes he has had no symptoms referable to the bladder.

Case V—M L M, seventy five years old referred by Dr Henry S Stark In 1898 he suffered for two months from frequent and painful urnation Following this attack the patient had been eatheterizing himself day and night for five years During this time he had had frequent attacks of cystits and orchitis At the time I saw him his condition was desperate He was having daily chilfs, his pulse was poor, and the general

condition wretched. The urine was loaded with pus, and the catheter had to be passed every two hours. In view of the man's desperate condition, a radical operation was out of the question. As a palliative procedure, suprapubic cystostomy was determined upon.

Operation.—September 15, 1903, this operation was carried out. The temperature gradually became normal, and the pus disappeared from the urine. Eleven days after the preliminary operation, the large firmly adherent prostate was removed in eight minutes. The tumor consisted of two lateral lobes, each the size of a small plum, and about an inch of the urethra ran through the gland. The man made a perfect recovery. He gained thirty-five pounds in weight; he was able to hold his water four hours during the day and six hours at night, and there is no residual urine. This is the most striking case of the series. No one, we believe, will deny that a perineal operation under ether or chloroform would have promptly brought about the death of the patient.

Case VI.—A. M. R., seventy-two years old, was referred to me by Dr. Joseph Anderson. There had been gradually increasing frequency of urination until a week before operation. Thereafter there had been complete retention. Catheterization was followed by bleeding.

Operation.—On January 22, 1904, under gas, the large prostate together with eight small calculi were removed. The entire operation, from the time that the knife was taken in hand until the packing was introduced into the bladder, took exactly six minutes. Recovery was complete and uneventful.

Case VII.—S. M., seventy-five years old, was suddenly unable to pass any urine on April 4, 1904. Attempts at catheterization were followed by considerable bleeding. On April 7, 1904, when I saw the man with Dr. Dinkelspiel, the bladder was distended with urine and blood-clots, and it was not possible to empty it completely. Accordingly I performed suprapubic cystostomy under gas, and removed a large number of clots. The bladder was drained for ten days. I then removed the entire prostate through the same incision in less than two minutes. The prostate was as large as a lemon and the urethra ran through its centre. The wound healed completely and remained healed for some time. Recently, probably in consequence of a very pendulous abdomen, the lower angle of the wound reopened, and

there was some leakage of urine The wound is again healed, and I have advised the use of an abdominal supporter

Case VIII—A N, fifty-four years old, referred by Dr C
Theobald There was a history of gradually increasing frequency
of urnation, associated with considerable pain Prostate only
slightly enlarged, no cystitis Prolonged medical treatment had
been of no avail

Operation—On June 30, 1904, under gas, a small, hard adherent prostate was removed with some difficulty in nine minutes. A small portion of the urethra which ran through the tumor was also removed. The bladder wound was closed by secondary sutures according to a method which will be described at a later day. Nineteen days after operation no more urine came through the suprapulue wound. Complete recovery was uneventful Eight weeks after the operation the man had sevual intercourse.

CASE IX—M R, sixty-seven years old, referred by Dr Breitenfeld During six years prior to operation there had been increasing frequency of urination During the past year urination had become more and more painful. The man had to urinate every half-hour during the day and frequently at night. The size and force of the stream had steadily diminished. By rectum a soft, uniformly enlarged prostate was felt.

Operation —On September 2, 1904, a prostate as large as a lemon, together with some of the prostatic urethra, were removed under gas in five minutes Secondary suture of the bladder was done Recovery, which was delayed by an exudate in the prevesseal space, was otherwise complete and uneventful

CASE X—E S, sixty five years old, was referred to me by Dr S Kohn During the two years prior to the time he came under observation, the man had noticed that his stream of urine was becoming smaller. There had been gradually increasing frequency of urination. Urination had become so painful that the man was incapacitated for work. The prostate was found very much enlarged, and the bladder extended two inches above the symphysis.

Operation—On October 6, 1904 under gas, a prostate the size of a small lemon was readily removed in seven minutes. The urethra ran through the anterior part of the gland Eight minutes were devoted to suture of the bladder and muscles, and drains were introduced. Two days later the drains were removed.

and the remaining opening in the bladder was sutured. The man is making a rapid recovery.

We believe that the good results we have been fortunate enough to obtain have been due to the following facts:

- I. No instrumentation to urethra or bladder before operation.
- 2. The use of nitrous oxide gas exclusively as an anæsthetic.
 - 3. Rapid work.

The value of nitrous oxide gas and of rapid work in these old prostatic cases cannot, we believe, be overestimated. In two of the cases we owed the recovery of our patients to the fact that the operation was undertaken in two stages, and without the use of ether or chloroform.

Note.—Since writing the above paper, I have performed suprapubic prostatectomy under nitrous oxide gas for the eleventh time. Mr. J. L., sixty-six years old, was referred to me by Dr. F. Foerster. For seven years the patient had had complete retention, and had been catheterizing himself day and night. During these years he had had several attacks of cystitis and orchitis. The bladder had become progressively more irritable until the catheter had to be passed every hour day and night. During the three months prior to operation the patient's general condition had become much impaired, and he had lost fourteen pounds in weight. The urine was alkaline and contained considerable pus. The prostate, which was as large as a lemon, was removed in the usual manner. The bladder was trabeculated and contained several calculi, one of which was so firmly embedded in the wall of the bladder near the fundus that it had to be scooped out with a sharp spoon. The removal of this calculus through a perineal incision would, we believe, have been impossible. Convalescence was free from complications, the wound is healed, and the patient is able to hold his water several hours.

CONSERVATIVE PERINEAL PROSTATECTOMY,1

THE RESULTS OF TWO YEARS' EXPERIENCE AND REPORT OF SEVENTY FIVE CASES

BY HUGH H YOUNG, MD,

OF EALTIMORE MARYLAND,

Associate Professor of Genito-Unnary Surgery The Johns Hopkins Hosp tal University

The time seems to be ripe for a study of results, and it is my intention to-day to give a summary of the results obtained by prostatectomy through the perineal route by the technique previously described by me (Journal of the American Medical Association, October 24, 1903, February 4, 1905, Monotsberichte fur Urologic 1904 Band 1x, Heite 5, 6)

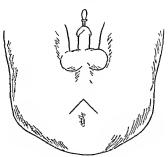


Fig. 3 -The inverted V cutaneous inc s on

In these papers the technique of the operation has been so fully detailed that I will not now make a repetition of its

¹ Read before the New York State Medical Society, February 1, 1905

various steps. Suffice it to say that the enucleation of the prostatic lobes is accomplished as shown in the accompanying drawings: Fig. 1 shows the inverted V cutaneous incision, each branch of which is about two inches long. This incision is simply carried through the fat and superficial fascia, the remainder of the operation proceeding by blunt dissection with the finger or handle of the scalpel, with the exception of those median line structures, the central tendon and recto-urethralis muscle which require division. In this way the posterior surface of the prostate is exposed with no more injury than through a median perineal incision, and one has the great advantage of being able to retract the rectum much better, thus giving a much closer and wider exposure of the prostate. The technique is not an "extensive dissection of the perineum" at all. Indeed, no important muscles are divided, and the wound heals as rapidly as a median one; in fact, it is the same, with the exception of the cutaneous portion.

Fig. 2 shows the retraction of the rectum, the exposure of the membranous urethra behind the triangular ligament, and the urethrotomy, performed on a grooved staff preparatory to the introduction of the tractor. (Fig. 3.) Great care should be taken to engage with sutures (or, better, with artery forceps) the mucous membrane of the urethra before attempting to introduce the tractor. After its introduction into the bladder, the blades are opened out (Fig. 4) and traction made, as shown in Fig. 5, thus bringing the prostate down into the wound, so that its posterior surface is presented. The capsular incisions which are made so as to leave the "median ejaculatory portion" undisturbed, as shown in Fig. 5, should be made about one and one-half centimetres deep, after which the external enucleation of the capsule (Fig. 6) and the internal enucleation of the urethra from the lateral lobes can be carried out with a blunt dissector. After the capsule and urethra have been thoroughly freed from the lobes, the deeper enucleation can best be done with the index-finger. In this procedure the tractor is often of the greatest service in drawing the prostate well into the wound, marking out the course

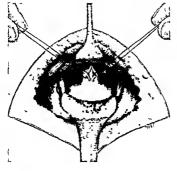


FIG a -Opening of urethra on sound preparatory to a stroduct on of tractor



of the urethra, and indicating when the enucleating finger approaches the vesical mucous membrane. The fenestrated blade is so easily palpated through the mucous membrane when the intravesical portion of a lateral lobe is reached, that one is at once placed on his guard and should rarely make a tear in the thin mucous membrane covering it I now find the lobe

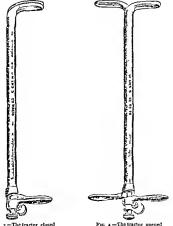


Fig 3-The tractor closed

forceps, shown in Fig 6 rarely necessary for the enucleation of lateral lobes the tractor and finger generally sufficing. The use of ordinary forceps on the lateral lobes with traction gen erally leads to tearing them into multiple pieces. Each lobe should be removed in one piece if possible. Morcellement is nearly always a poor technique to employ and unnecessary

If a median lobe or bar is present, it can generally be removed by engaging it with one blade of the tractor, making traction and rotating at the same time. This will generally cause the lobe to present in the left lateral cavity (Fig. 7), where it can be engaged with the small lobe forceps, or, if it is too small for these, by some small toothed forceps, and enucleated or cut away with scissors.

If it is too small to be engaged with the blade of the tractor, this instrument may be removed and the index-finger of the left hand inserted through the dilated urethra and used as a tractor, as shown in Fig. 8.

In certain cases in which a fibrous median bar or lobe is impossible to remove by the technique described above (in which every effort has been directed to leave the "ejaculatory bridge" undisturbed), it may be necessary to deliberately cut through the capsule covering the ejaculatory ducts, and thus expose and enucleate or excise the median prostatic enlargement, as shown in Fig. 9. This can be done without cutting into or removing the urethral floor. The objections to this method are that it destroys the ejaculatory ducts and leaves the torn ends of the vasa deferentia opening into the wound, which nearly always becomes suppurative in a few days, thus inviting an ascending infection, epididymitis, etc.

I feel sure that the frequent occurrence of epididymitis in the cases of Albarran, Murphy, and others, is due to the fact that the ducts are destroyed, and their natural protective valvelike urethral orifices replaced by patent torn ends of the vasa opening into a suppurative cavity.

If a vesical calculus is present, it can be removed without tearing away the urethral mucous membrane by simply dividing the lateral wall of the urethra and dilating the vesical neck, as shown in Fig. 10. In this way I removed a stone measuring two inches in diameter. Although unnecessary, the divided urethral wall was sutured in this case.

In some cases simple dilatation of the prostatic urethra will suffice for the insertion of forceps and the removal of the stone.

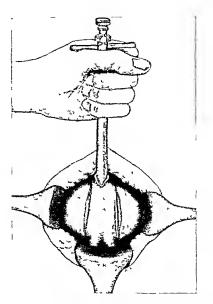


Fig. 5—Tractor introduced blades separated tract on made exposing posterior surface of prostate. Incisons in capsule on each side of ejeculatory ducts.

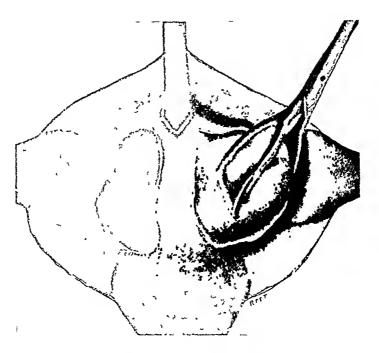


Fig. 6 —Enucleation of lobes | Forceps in position

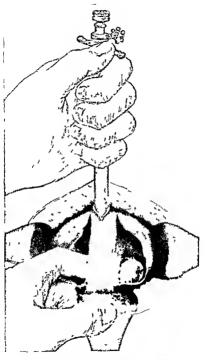


Fig. 7 —Showing technique of delivery of n ddle lobe into cavity of left lateral lobe

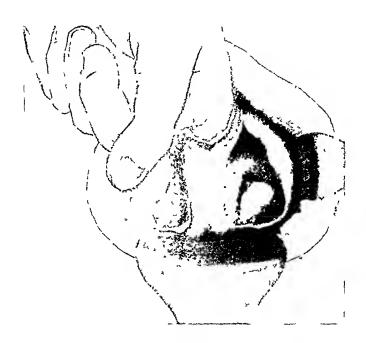
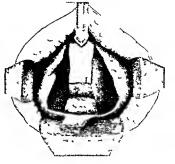


Fig. 8—Showing use of finger instead of tractor to draw down small median lobe into lateral cavity.



F G 9 SI g suburethra me hod of enucleating med an bar

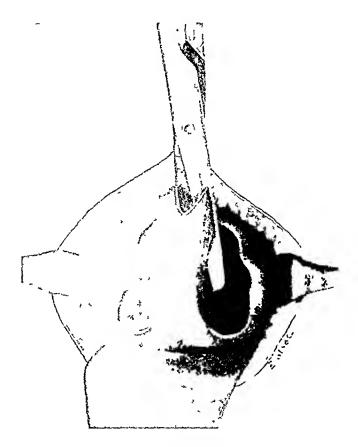


Fig. 10—Showing division of Interal wall of urethra to allow extraction of large calculus through Interal cavity

After completion of the operation upon the prostate, a double drain (two catheters tied together) is inserted into the bladder, fastened by a suture at the apex of the skin wound, and continuous irrigation begun. The lateral cavities are packed with gauze, but no extracapsular packing used

The index finger of the right hand encased in a rubber glove is then inserted into the rectum, and its anterior wall examined by palpation with the other index finger. If the operator has been careful to divide the recto urethralis muscle, and to hug the membranous urethra and capsule of the prostate, no injury should be found. It is nevertheless advisable to support the naturally thin rectal wall by drawing together the separated edges of the levator ani muscles, which form its normal covering. Only one catgut suture is necessary to thus restore the perineum and keep the rectum from being pressed upon by the packing, which is removed on the second day along with the times.

The after treatment consists in abundance of water by mouth (or infusion), getting the patient out of bed as soon as possible, and avoidance of instrumentation

Results—During the past two years I have operated by this method 75 cases
Their ages were as follows Over 80 years, 4 (81, 82, 82, 87)
Between 70 and 79 years, 23, 60 and 60 years, 20, 50 and 50 years, 14, under 50 years, 5

Mortality —Among these seventy-five cases there were no deaths definitely attributable to the operation, in that all reacted well and convalesced satisfactorily for at least two weeks after the operation. I believe, however, that all deaths should be included, and therefore place in the mortality column the four deaths which have occurred.

CASE I —Man aged eighty one years, entered the hospital with a bladder holding about three litres, could not be catheterized, was aspirated for four days, permeal prostatectomy then performed, with satisfactory convalescence for three weeks. After that the patient gradually became urgenic and died five weeks after the oneration

Case II.—Man aged seventy-two years, in good condition. Perineal prostatectomy, reacted well, out of bed and walking in a week, fistula closed under two weeks, and patient ready to go home. On fourteenth day patient in excellent condition, voiding urine naturally. High enema given on account of constipation; immediately afterwards sinking spell and death in a few minutes. Autopsy, pulmonary embolism. Bladder and kidneys in good condition.

CASE III.—Man aged seventy-six years, entered hospital with complete retention, nausea, vomiting, high fever. Had had nausea, vomiting, and symptoms of chronic uræmia for six months. Catheterization and drainage for about ten days, condition somewhat improved. Perineal prostatectomy, reacted well, after a few days recurrence of nausea, vomiting, inability to take nourishment for two weeks. Death. Autopsy, double pyohydronephrosis, ureters dilated to size of thumb.

CASE IV.—Man aged eighty-seven years. Very large prostate, patient in good condition. Perineal prostatectomy, patient reacted well. Walking during the second week, temperature normal, convalescence good. Sudden development of cough, fever, signs of bronchitis on twenty-first day after operation. Transferred to medical department. Rapid spread of consolidation, death on the twenty-fifth day. Double pneumonia.

In reviewing these cases, I feel satisfied that no other treatment could have saved Cases I and III, and that in Cases II and IV the operation contributed only indirectly to the development of the fatal disease.

Should the rule of one well-known prostatectomist "not to include patients dying after six days" be accepted as the criterion, I might here claim no mortality. I feel, however, that it is only right to include all cases. This series shows that the operation itself is practically free from mortality, other than such accidents as might follow any operation.

Restoration of Voluntary Urination.—Even when the catheter had been used for years, these patients are now able to void urine naturally in all cases. In only two of the seventy-five cases is there residual urine of any consequence, in both of which about 300 cubic centimetres still remain after urina-

tion Of the other cases the highest amount obtained now by catheter is about thirty cubic centimetres

The obstruction may be said to have been completely removed in all cases but these two. In one of these the cystoscope shows a small transverse fold of mucous membrane in the median portion of the prostate, in the other a small rounded intra urethral lobule is to be seen. In both of these cases greater care at the operation would probably have de texted and removed these obstructions, so that it may justly be said that normal free urmation can and should always be established after the operation. In a number of cases, cys titis and contracture of the bladder exist, and more or less frequent urmation is the result. These cases can probably be cured by hydraulic dilatation. If an unusual frequency of micturition is present after the operation, the patient should not be discharged without an investigation being made to see whether the bladder is markedly contracted or not, and if it is, treatment should be instituted to enlarge its capacity.

Continence of Urine—In some cases urine was voided at intervals, with no period of incontinence, immediately after the removal of the drainage tubes on the second or third day As a rule, there has been an incontinence for several days, and in two instances a weakness in the sphincters was manifest, when the bladder became full, for several months. One of these is now well, and the other has no incontinence at night. No case of continual incontinence has occurred among these seventy five patients.

In only one case has anything like a stricture of the urethra developed after the operation. In this case the median portion of the prostate was removed, as shown in Fig. 9, and in so doing, a portion of the floor of the prostatic urethra was accidentally excised. His physician reports that he found a stricture which was easily dilatable. I have not personally observed any case of stricture following the operation, and feel that the reported presence of only one case shows that instrumentation is entirely unnecessary as a routine procedure after the operation.

Preservation of Sexual Powers.—I have endeavored to hear from every patient, so as to find out what effect the operation has had on his sexual puissance.

I will tabulate the replies of those who claim to have had normal sexual powers before the operation. Of these:

Four were under 50 years of age. Three have erections and normal coitus; one has impregnated his wife; one has no erections.

Six between 50 and 59 years. Erections present, 5; coitus successful, 4; erections feeble, 1.

Fifteen between 60 and 69 years. Erections present, 10; coitus successful, 6; coitus not attempted, 4; erections not present, 5.

Six between 70 and 79 years. Erections present, 4; erections not present, 2.

Those cases in which the sexual powers were not present before operation need not be considered. A glance at the tabulation above shows that in a large proportion of the cases the erections and sexual puissance have been maintained after the operation. There are, however, a certain number of cases in which erections have not yet reappeared.

What effect the preservation of the prostatic urethra, the verumontanum, and the ejaculatory ducts may have upon erections and ejaculations can be surmised by a comparison of these results with those of Albarran and of Murphy, who cut away these structures in their operations, and have reported an absence of erections or sexual puissance in nearly all cases after the operation.

Fistula.—The perineal fistula has usually healed within two weeks. In a few instances it has closed within eight days. In only two cases that I know of has it persisted. In one of these the prostatic tissue removed has been found to be carcinoma.

Of the four cases of recto-urethral fistula which I reported in my last paper, all have, I am happy to say, been cured by subsequent operation. After failing in several attempts at closure, I have finally adopted the plan of supplying suprapuble drainage before closing the rectal and urethral openings separately. In this way the purulent urine is diverted from the sutured urethra, which is thus given a rest, and heals promptly. The suprapuble cystotomy adds nothing to the gravity of the operation, and has changed the results obtained from constant failures to constant successes.

These fistulæ occurred in men whose vitality was very poor (one had diabetes), but I believe that at least two would not have occurred but for the placing of packing against the unprotected rectum

In the last thirty-five cases in which the levator ani muscles have been reapproximated by a catgut suture, and care has been taken to have no gauze press upon the rectum, there has been no case of rectal break down

In closing, I will say that after about 200 operations on account of hypertrophied prostate, among which were eighty-five Bottim operations with six deaths, twenty suprapubic prostatectomies with three deaths, I have come to the conclusion that for most cases perineal prostatectomy is the safest and surest and quickest method of curing the patient. That whereas the Bottim method is the simplest and quickest for a certain limited number of cases, which can best be determined by the cystoscope, it is not so safe, and nothing like so uniformly sure of relieving the obstruction as the perineal enucleation. The suprapubic route may be used in certain large intravesical lobes.

I wish to state again my belief in the great advisability of a careful preliminary cystoscopic examination. In this way only have I been saved from several serious blunders

The recognition of diverticula, incarcerated calculi, pediniculated prostatic outgrowths, and early carcinoma of the prostate cannot be made without the cystoscope, and an accurate mapping out of the prostatic enlargements is of great advantage in performing a perineal operation where careful preservation of important and non-obstructive structures is the aim of the operator

THE CAUSE OF INCONTINENCE AS A SEQUEL OF PROSTATECTOMY.1

BY E. WOOD RUGGLES, M.D.,

OF ROCHESTER, NEW YORK.

A FEATURE of prostatectomy which has interested me greatly is the occurrence of incontinence, perhaps because the percentage of such cases has been rather large at Rochester.

One operator has performed twenty prostatectomies with one case of incontinence, another ten with one case, another seven with two cases, and two others one case each, one of these being followed by incontinence. Total, thirty-nine cases with five cases of incontinence, or 13 per cent. One of these cases recovered bladder control after three months and another after over two years, leaving three cases of apparently permanent incontinence, or 72/3 per cent., a rather high rate.

Francis S. Watson, in his admirable article on prostatectomy, published in the Annals of Surgery, June, 1904, gives a very complete *résumé* of the results and complications in 530 cases, and states the proportion of incontinence as 3½ per cent., which is probably considerably below the true figure.

This phenomenon has been variously explained. Lilienthal, in commenting upon Gibson's case of incontinence, reported at the New York Surgical Society, April 8, 1903, said that "Incontinence often occurs for weeks and months, when the control has been good immediately after the operation." His theory is that "The scar formed at the neck of the bladder and in the urethra is at first succulent and forms a good valve. Then the cicatrix becomes hardened, causing the formation of a rigid, patent, urethral tube, permitting the urine to enter the deep urethra, and dribbling results. Later on the scar atro-

¹ Read before the Medical Society of the State of New York, February 1, 1905.

INCONTINENCE AS A SEQUEL OF PROSTATECTOMY 559

phies and again softens, and full control is once more regained"

The varying duration of the time required for recovery, ranging from two or three weeks to as many years, seems to me to combat this theory, and other points make it absolutely intenable.

Professor James E Moore, of Minneapolis, in the Annals of Surgery, March, 1904, says that "Incontinence after prostatectomy is due to injury to the muscles or the nerves or to the neck of the bladder, most often the latter, that a careless or inexperienced operator may very easily tear away that portion of the sphincter of the bladder just below the urethra and m front of the third lobe, which would be very liable to be followed by incontinence"

George Woolsey, in discussing the three cases of incontinence reported by Parker Syms at the New York Surgical Society, November 13, 1901, said that the occurrence of incontinence may be partly explained by assuming that the fibres of the prostatic urethra were torn and not properly repaired

If injury to the vesical neck, or prostatic urethra, or both, is the cause of incontinence, how can we intelligently explain the remarkable results of Moynihan, of Leeds, who intentionally removes the entire prostatic urethra, and of Freyer, of London, who has been forced to do the same in several of his cases, yet without the occurrence of incontinence

In one of the cases operated upon at Rochester, there was a great deal of laceration of the tissues during the operation, the patient did very badly thereafter, being at the point of death for two weeks, and large sloughs, including a great deal of the bladder wall, one piece of mucosa being nearly three inches in diameter, came away, so that the attending physicians estimated that at least one third or one-half of the bladder sloughed away. Yet this man was never troubled by incontinence

Now it seems to me that the premises in the above reasoning are entirely incorrect and misleading. The mechanism of

urination and the significance of the two-glass test of the urine have apparently been quite forgotten.

We all know, or ought to at least, that the vesical sphincter is a comparatively weak muscle, and that the only muscle, by the action of which we are enabled to resist a strong desire to urinate, is the external sphincter or compressor urethræ, which is a strong, voluntary muscle, surrounding the urethra, in the space between the two layers of the triangular ligament, its anterior margin forming the boundary between the anterior and the posterior urethra.

In health, as soon as three or four ounces of urine have collected in the bladder, the vesical sphincter relaxes and permits the urine to pass down, filling the posterior urethra, until it meets the resistance of the external sphincter. The function of the vesical or internal sphincter is then at an end until after the next act of urination.

Often, restrained by circumstances or by false modesty, men hold their urine until the bladder is so distended that its strong muscular wall is paralyzed, and it becomes impossible to pass the urine at all, or only by dribbles. This vigorous power of resistance is wholly due to the external sphincter.

It is then evident that we must look farther and search deeper for the true cause of incontinence in these cases. Paralysis, partial or complete, of the external sphincter must be present, in order to explain it satisfactorily.

When we seek to ascertain the nerve supply of the external sphincter, we are met at once by contradictions. Gerrish and Morris give its supply as derived from the dorsal nerve of the penis, a branch of the pudic nerve. Gray and Cunningham give as its supply a branch of the deep or muscular division of the perineal nerve, which is derived from the pudic. Von Bardeleben gives its supply as a branch of the superficial division of the same perineal nerve.

According to Dr. George Woolsey, all these nerves are safe in the median incision of Syms and others, the lateral incision of Von Dittel, and also in the inverted V of Young,

unless the angle of the V is placed far forward and the arms diverge very greatly, which probably rarely happens

But, where such difference exist, it is at least conceivable that possibly neither of these authors is correct, and that a branch, whose course is nearer the prostate, is its real supply

It seems to me that either this theory of a nerve supply of the external sphincter, running close to the prostate, and sometimes injured in the strenuous manipulations attending its removal, must be true, or else the injury must be looked for in the operation on the membranous urethra itself. This is accompanied, nearly always, by great stretching and tearing of the posterior urethra, sufficient to permit the exploration of the bladder with the finger, the passage of instruments and either the extraction of calculi. In these manipulations, especially at the hands of inexperienced or bungling operators there is certainly great damage done to the external sphincter muscle, and, in addition, its nerve supply may be totally or partially cut off, especially if the incision is not made exactly in the median raphe.

If it be objected to this theory that, in a large proportion of cases, full bladder control is ultimately recovered, it is only necessary to refer to the fact that in many cases where an inch of nerve, or even an entire ganglion, has been resected in the treatment of obstinate neuralgia, both motion and sensation have returned after a variable length of time

Also to be considered is the fact that pressure is capable of producing paralysis. For instance, the very trifling pressure on the ulnar nerve produced by sitting in a chair with padded arms will, if long continued, cause, in some persons, an obstinate ulnar paralysis. It is quite conceivable that the rather violent operative procedures in prostatectomy may produce similar effects by extreme pressure for a short time.

Incontinence following simple external urethrotomy, where less cutting, dilatation, and laceration are practised, is, in my personal experience and reading, very rare

My suggestions would therefore be that, if perineal prostatectomy is performed, the incision into the urethra should be made as close to the prostate as possible, exactly in the median raphe of the compressor urethræ, and the utmost care be exercised to avoid stretching and laceration of the muscles.

But, judging from the statistics of Freyer and Moynihan, if one wishes to assure himself against the occurrence of incontinence, the suprapubic should be the operation of choice, unless decided contraindications exist, and, according to Freyer, there are no contraindications, if the patient is in a fit condition to undergo an operation of any gravity whatever. I have carefully read over the histories of his first 105 suprapubic operations, ending October 29, 1904, and following every case which survived is one of these two remarks, "Patient is able to retain and pass his urine naturally," or, "Untroubled by any urinary symptom."

It appears, however, to be a grave and needless interference to remove the prostatic urethra, according to Moynihan's method, unless absolutely unavoidable. Nature is capable of rectifying many defects in operative procedures, but it is certainly better surgery to leave intact the normal epithelial covering of the urethra, rather than to substitute one built up by granulation tissue, thus increasing the danger of sepsis and the liability to subsequent contraction.

I will advance another theory, according to which this, as a rule, temporary symptom might be accounted for, although I do not believe it to be the true one. It is certainly a wise provision of Nature that so important an outlet as the urethra should be put under the control of two, separate muscles, and that their action is so regulated that each of them does duty, alternately, for approximately half of the time. These periods of rest may be necessary to the perfect performance of their function. If so, it is readily comprehensible that the destruction or paralysis of the internal sphincter may produce incontinence, through paralysis of the external sphincter, caused by the lack of its normal periods of relaxation.

For this theory would speak the facts that this incontinence is rare during sleep, that it becomes worse towards evening, and above all that the muscle almost always finally performs its function perfectly, generally in a few months, in the same mamer as other organs which develop to meet additional work when thrust upon them

Against it would be the very strong and probably decisive argument that in Freyer's and Moynihan's cases, where the whole prostatic urethra has been removed, not even temporary incontinence occurred

The following statements in one of Freyer's articles certainly go far to prove the correctness of my theory. In describing the autopsy of a case, which died twenty-two days after operation from acute maina, he says, "The suprapuble wound had practically closed. There was nothing abnormal about the bladder, except that it was pear- or funnel-shaped instead of globular, the inner orifice of the urethra terminating at the triangular ligament. It would thus appear that, after complete enucleation of the prostate, the prostate urethra, deprived of its normal support, widens out in funnel fashion and practically becomes part of the bladder cavity. It further demonstrates definitely that the true sphinicter of the urethra (or blodder) is situated at the membronous portion of the urethra." (Not italicized in the original)

On February 4, three days after the reading of this paper, there appeared in the New York Medicol Record an article by Dr E G Ballenger, of Atlanta, Georgia, in which, among his "Conclusions," he states, "In the perineal operations carefully cut the central tendon of the perineum close to the rectum, but with the finger in it to avoid injury. Avoid laceration of membranous urethra, as incontinence of urine will follow." So far as I know, this is the only other published recognition of the fact that incontinence, after prostatectomy, is due to interference with the external sphincter muscle

BIBLIOGRAPHY

Cunningham Anatomy
Freyer British Medical Journal, July 20, 1501, July 26, 1502, April 18,
July 4, October 17, 1503, May 21, October 29, 1504.
Gerrish, Text Book of Anatomy

Gibson Annals of Surgery, August, 1903, p 306
Gray Anatomy

Lilienthal. Annals of Surgery, August, 1903, p. 307.

Moore. Annals of Surgery, March, 1904.

Morris, H. Human Anatomy.

Moynihan. Annals of Surgery, January, 1904.

Syms. Annals of Surgery, April, 1902.

Von Bardeleben, Haeckel, und Frohse. Atlas der topographischen Anatomie des Menschen.

Watson. Annals of Surgery, June, 1904.

Woolsey. Annals of Surgery, March, 1902, p. 409.

THE CHOICE OF OPERATIVE METHOD FOR THE REMOVAL OF THE HYPERTRO-PHIED PROSTATE

BY LEWIS STEPHEN PILCHER, MD,

OF NEW YORK,

Surgeon to the Method at Ep scopal and to the German Hospital in Brooklyn

THE satisfactory establishment of surgical efforts for the radical removal of urmary obstruction, caused by enlargements of the prostate gland, must be accepted as now thoroughly accomplished

It is of interest to note, in surveying the literature of the subject, that among the many different methods of attacking the prostate that have been proposed by different surgeons, practically equally good results are reported to have been secured by the most diverse methods by men who had become specially skilled in their application. It cannot be, however, that the choice of a method is a matter of indifference, a ques tion of chance or prejudice. In view of the frequency of the malady-every hamlet has its prostatics, wherever there are old men obstructive dysuria will be met with-the general recognition of the possibilities of operative relief will compel the frequent attempt on the part of the general surgeon to supply it So that the question is no longer what is possible in the hands of the specially expert, but what in the light of our present knowledge of the anatomical relations and the patho logical changes of the prostate gland, will in the hands of the average surgeon most certainly and safely, wholly and permanently, relieve the obstructive dysuria that the prostatic disease has produced

The question of *mortality* naturally takes precedence in the consideration of any operative proposition. There must of necessity be some mortality in any and every kind of surgical intervention in prostatic patients. Sepsis, renal insuffi-

ciency, and the multiple degenerations incident to old age are complications in varying degrees of combination, that have to be reckoned with in many instances, and which must determine a fatal exit inevitably in a certain proportion. The proper selection of cases and the due preparation of them for the hazards of operation will always engage the earnest attention of the surgeon, and by these means the rate of mortality will be kept at a minimum. With the demonstration of the comparative safety and certain benefits of operation will come a resort to it much earlier in the course of the disease than has hitherto been the case, with which will come a marked diminution in its hazards and a corresponding lowering of its death-rate.

It has not failed of notice that total removals of the gland, by whatever method, have been attended by a smaller mortality than have partial removals of obstructing parts. In other words, the wider open the door which has been left for the free exit of infective materials, the greater the freedom from subsequent septic complications. In this matter of drainage, as in all other precautions which pertain to serious surgery in any part of the body, operations upon the prostate are governed by the well-established dicta of general surgery.

At present, it would seem that a surgeon must expect a death-rate after prostatectomy of from 5 to 10 per cent. While he may in some instances possibly have the good fortune to have a considerable series of cases without a death, yet a longer continuance of work has been found even in the experience of the most careful and fortunate to be attended with a share of mortality.*

^{*}The following recent statistics are of interest as examples of unusual immunity from mortality: Small median perineal incision; finger enucleation unaided by sight: Goodfellow, 78 cases, 2 deaths; Murphy, 51 cases, 1 death; Syms, 33 cases, 2 deaths. Free transverse perineal incision; visual control of enucleation by finger and instruments: Young, 75 cases, 4 deaths; Albarran, 59 cases, 2 deaths; Hartmann, 36 cases, 2 deaths; Proust, 30 cases, 0 deaths; Pauchet, 20 cases, 1 death; Rafin, 20 cases, 1 death. Total enucleation by finger unaided by sight through suprapubic opening in bladder: Freyer, 107 cases, 5 deaths.

Expectation of Cure-Second only to the question of mortality is that of expectation of cure. The primary indica tion is the re establishment of the ability of the individual to readily, fully, and painlessly evacuate his bladder With regard to the restoration of normal function it must not be forgotten that the statements both of patients and of surgeons should always be considered as relative Prepossession and enthusi asm often lend a rose color to the reports of results, and a more close scrutiny of real conditions may often elicit information as to attendant infirmities which really modify the result Nevertheless, even with these modifications, the fulfilment of the supreme indication viz, the removal of the urinary obstruc tion, is a sufficient achievement to obscure the presence of many lesser evils. With these reservations, the accumulated experience of the past ten years is that in more than 60 per cent of the cases that have been subjected to total prostatectomy, the ability to empty the bladder spontaneously has been restored and has been maintained permanently, so that the use of a catheter has been no longer necessary, there was but little, if any, residual urine and the quality of the urine has become fairly normal Coincidently, the general health has greatly improved In a very large proportion of the remain ing cases a marked improvement to the obstructive symptoms has resulted, the amount of residual urine has decreased, the intensity of the cystitis has diminished, and the frequency of catheterism has been lessened, and the facility of passing the instrument has been increased

The infirmities which claim acknowledgment as possibly frequently modifying the perfection of the result are, Impo tence, Urmary Incontinence, Epididymitis and Orchitis, Fis tulæ, Stricture of the Urethra

I Impotence - The removal of the posterior central seg ment of the prostate through which the ejaculatory ducts pass on their way to their openings of discharge into the prostatic urethra necessarily carries with it a greater or less extent of these ducts, and entails the later cicatricial obliteration of the duct stumps left behind It is obvious that in attacks upon those forms of obstructive overgrowth in which middle lobe hypertrophy is a determining factor, such injury to the ejaculatory ducts is very probable, and often inevitable, except when special precautions are taken to preserve them.

The experience of surgeons in operative attacks on the prostate thus far has shown, however, that in a very considerable proportion of cases that come to operation, the obstruction is not due to large median tumors. In my own work, of twenty-three cases thus far operated on, in but eight of the entire number was the hypertrophy attended with marked median enlargement. In eight of them the lateral lobes were chiefly and but moderately enlarged, and in the remaining seven the prostatic overgrowth was of the hard, firm, fibrous variety.

The practical bearing of this observation upon the subject of inquiry is this, that in the denser specimens of such prostates not at all, and in the mixed forms only to a limited degree is enucleation of tumor masses possible, and their removal is best accomplished by systematic dissection or morcellement with the help of forceps and scissors; and if it is possible to so direct these procedures as to spare the posterior central ejaculatory ducts bearing segment, the likelihood of the production of impotence as a consequence of the operation would be lessened.

Horwitz,* however, has advanced the theory that impotence may follow prostatectomy independently of any wound or resection of the ejaculatory ducts, due to the disturbance of the important nervous mechanism of the gland by the operative injury inflicted on the gland as a whole. He calls attention to the fact that cases are constantly met with of chronic disease of the prostate in which sexual debility is a marked symptom, in which the ejaculatory ducts and seminal vesicles are healthy. His conclusion is that any surgical interference with the prostate gland in men of advanced years, whose sexual

^{*}Horwitz. Radical Cure of Senile Hypertrophy of the Prostate Gland. New York Medical Journal, 1904, August 6, 13, and 20. Reprint, p. 30.

vigor is already either on the decline or in abeyance, would be likely to result in sexual exhaustion. While it is true that prostatic dysuria is more frequently met with in men in whom, by reason of their age, sexual vigor is in the decline or is already merely a memory, nevertheless the instances are not infrequent in which the disease develops at an age when virility is still well preserved. The question of impotence, caused by operation, must loom up large to such a man when called upon to decide whether he shall submit to a prostatectomy or shall enter upon or continue a catheter life When however, the catheter life has come to its inevitable end, and the question is simply one of the preservation of life and the obtaining relief from an intolerable suffering, then the question of impotence or of other mere infirmities becomes insignificant

In the case of men still possessing fair sexual vigor, it is evident that the surgeon, keeping in view always the prime indication for the full and absolute removal of obstruction, so as to ensure a permanent ability to spontaneously empty the bladder, should adopt an operative technique that will avoid as far as possible injury to the ejaculatory ducts. While in many cases this will be impossible, and they must be swept away in the fulfilment of more imperative indications, while in yet others the damage to the sexual apparatus, independent of the continuity of the seminal ducts, may so disturb the pos sibilities of erection and intromission as to produce a condition of practical impotence, there yet remains a very considerable proportion of cases in which the preservation of sexual vigor is to be expected, as the result of the adoption of suitable methods of operative technique

Urmary Incontinence in some degree is an occasional result of prostatectomy, whatever the operative method em ployed Some defect in the ability to retain urine in the As a rule, however, after a few weeks or months at farthest, complete control over the bladder is regained. In a small pro portion of cases some lack of control persists indefinitely, causing urmary leakage when moving about, or at times when

asleep, or whenever the bladder becomes somewhat distended, or when the individual is fatigued. It is impossible as yet to secure reliable data on sufficiently large scale to permit of the formulation of percentage calculations of any value as to the relative frequency with which permanent incontinence in some degree follows the operation. It is, however, an infirmity which is of little magnitude by the side of the serious malady for which it has been substituted.

Epididymitis and Orchitis frequently develop in the early aftercourse of cases of prostatectomy, as the result of infection transmitted from the prostatic site. It not infrequently is immediately excited by the passage of sounds after the removal of the primary drainage-tubes, but it may also arise without the intervention of any such instrumentation. In my own twenty-three cases this complication has appeared in six instances. It is usually slight in degree and unimportant in its relation to the convalescence; but in two of my cases it went on to suppuration.

Fistulæ.—Suprapubic fistulæ, perineal fistulæ, and rectourethral fistulæ are among the occasional sequelæ of operation for the removal of the prostate. They occur with sufficient frequency to make their mention necessary in any complete consideration of the subject of prostatectomy, but yet so rarely as to have very little practical bearing on the prognosis of a given case. In the absence of great loss of substance in the original wound, the failure of a suprapubic or perineal opening to close is usually due to some contraction in the anterior urethra, and, as a part of the cares in any given case, the surgeon should secure perfect freedom of the urethral lumen throughout its whole extent.

Recto-urethral fistulæ may result either from an accidental tear through the anterior wall of the rectum in the course of the efforts to expose the prostate or from later sloughing consequent upon intense local infection, or from drainage-tube, or tampon pressure. The very close relation of the prostate and the rectum at once suggests the difficulty of separating them without injury to the rectum, and the possibility of such injury doubtless had much to do in discouraging earlier

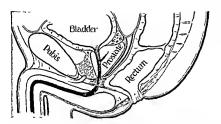


Fig. 1—Diagram to illustrate suggest relations of prostate to rectum and pernaema (Modified from Froust). Note especially the space between anterior wall of rectum and interior surface of prostate, note the drawing of the superasplaneture part of the anterior wall of the rectum towards the arrethra and publish by the recto-arethralis muscular fores note the projection into the penneum of the bulk, of the cotypes spongeous my penneum.

attempts on any general scale to attack the prostate tunately, however, between the capsule of the prostate and the underlying musculofibrous external coat of the rectum there is an appreciable layer of loose connective tissue which forms a line of easy cleavage, so (Fig 1) that when once the cap sule of the prostate has been exposed, the further stripping back of the rectum to any degree that may be necessary is com paratively free from danger of injury to the rectum. It is that portion of the rectum which is anterior to the prostate, and which is pulled forward towards the membranous urethra by the recto-urethralis muscular fibres, which is most likely to be the seat of injury when the prostate is approached from the peri neum With care and due attention to the anatomical relations of the structures involved, this point of danger may usually be avoided, but it is quite conceivable that in occasional instances the relations and texture of the perincal structures may be so altered by fibrotic or inflammatory changes as to make the de sired detachment and pushing back of the rectum without in jury very difficult to accomplish That such injury has occurred at the hands of many able surgeons is a matter of record, and it is not unreasonable to believe that not all the instances in which it has occurred have been published

In my own earlier experience such injury to the rectum occurred twice as the result of misadventure in the course of the effort to expose the prostate, both times in cases of small fibrotic prostates with increased rigidity of the recto urethral muscular mass In a third case an opening into the rectum occurred fourteen days after operation, as the result of a slough due to wound infection. In two of these cases the fistula was subsequently completely repaired by plastic operation, in the third case, a plastic failed to close the fistula and, other circumstances having prevented its repetition, the fistula persisted, during the remaining two and a half years during which his life was prolonged, about two-thirds of the urine passing into the rectum at each urination, requiring the man to sit upon the stool to void it

Urethral Stricture does not seem to have followed to any serious degree the extensive lacerations and removals of the prostatic urethra which have marked many of the operations upon the prostate. It has been frequently the case that the entire prostatic urethra has been taken away with no subsequent disturbance of the urinary functions. Extensive tearing away of the prostatic urethra has accompanied, certainly in some, and probably in most, if not all, the extensive enucleations done by the suprapubic route; a varying degree of injury to the floor and lateral walls of the prostatic urethra attends most of the perineal methods of operation. The claims of many operators, who remove prostatic masses guided by the sense of touch alone, that very limited injury of the urethra results from their manipulations, are not sustained by our knowledge of the anatomical conditions of the parts. The urethra in its course through the prostate does not present such distinct layers in its walls as are found in its membranous and penile portions; nor does it present any such recognizable layers as does the capsule of the gland from which the adenomatous masses of an enlarged organ can be readily peeled. away. It consists of a few layers of columnar epithelium resting on a base composed of connective tissue and muscular fibres which are directly continuous with the stroma of the gland itself, and surround and support likewise the score and more of ducts to which the primary lobule outlets converge, and which open upon the floor of the urethra, and which also are lined by an extension of the urethral epithelium. (See Fig. 4, page 484.) In other words, the submucous and muscular coats belonging to the urethra in other parts of its course are here replaced by prostatic substance. It seems to the writer that the laceration of the urethral wall by attempts to tear out more or less of the glandular substance external to it can be prevented only by the most careful and delicate manipulation, conducted in full view and with the assistance of careful dissection as the enucleation approaches the vicinity of the urethral wall. The periphery of these prostatic masses can readily be enucleated from the capsule with a blunt dissector or with the finger-tip; but upon the urethral side of the mass the condition is different. They can be readily torn away, it is true;

but the operator who thinks that in effecting this he leaves the prostatic urethra intact is probably mistaken. More em phatically is this the case in the presence of the hard fibrous prostate

It may be well, therefore, to accept as one of the usual accompaniments of prostatectomy, as a surgical procedure, a very considerable laceration and loss of substance of the pros tatic urethra In view of this, the fact of its regeneration becomes one of considerable surgical interest. When the roof and a considerable portion of its lateral wall is left after the enucleation is completed, it is natural to expect that the conditions suffice to insure a patent mucous lined canal as wound healing progresses, in those other cases in which nearly complete enucleation of the whole gland en masse, bringing with it a considerable segment of the whole circumference of the urethra, is effected by attack from within the bladder there remains an irregular, but in general a funnel shaped, cavity, into which the bladder mucosa must prolapse, and as the process of repair progresses furnishes an advancing line of epithelium to cover any raw surface still present. From the end of the membranous urethra likewise a similar epithelial ingrowth may contribute to the ultimate result, from the ducts and lumina of any of the gland substance that may have escaped the surgical attack an additional source of epithelium may be presented This may explain why the possibility of speedy regeneration of an adequate epithelium lined canal through the eviscerated prostate has been demonstrated by abundant clinical experience The very natural apprehension, entertained by many, that intractable stricture would be a common sequel to these operations has not been realized In order to secure this immunity from later stricture, it would seem that the urethral lesions must be restricted to the prostatic portion of the urethra It would seem also a sound sur gical procedure in all cases to place a good-sized rubber drainage-tube into the bladder through the prostatic hiatus during the early days after operation, to be replaced later, possibly for a week or more, by a catheter a demeure, this, in addition to the advantages of drainage, for the purpose of favoring and controlling the formation of a suitable channel, along which the process of epithelial proliferation shall extend. The occasional use of a full-sized sound may be adopted as a substitute or a succedaneum to the catheter for a time in the after-history of such a case.

INDICATIONS FOR OPERATION.—In the preceding observations the attempt has been made to make as full and just a statement as present experience allows of the expectation of life and degree of cure in cases of prostatic dysuria properly to be expected from the various methods of removal of the obstructing masses. In view of the results narrated, it would be impossible to overstate the magnitude of the benefits which direct surgical attack now offers, remembering the frequency of the complaint, the suffering and disability imposed by it, and the certain disastrous ending to its palliation by catheterism. In adding this latter observation as to the perils of catheterism, the writer desires to avoid exaggeration. It is granted that in many instances for a prolonged period the habitual use of a catheter is well tolerated, in some instances by reason of scrupulous attention to asepsis in its use, but more frequently as a result of a special immunity against bladder infection possessed by the individual; but even in the most resistant of individuals cystitis sooner or later develops, and with this the whole train of symptoms and conditions which are included under the term of prostatism. Notorious is the liability of such catheter subjects to attacks of prostatic congestion, whereby the possibility of the facile introduction of the instrument is destroyed for the time, and the sufferings and dangers of acute complete retention of urine are precipitated.

It has long been recognized that the degree of obstruction bears no necessary relation to the size of the prostatic enlargement. Senile degeneration of the bladder wall, lessening the expulsive power of the bladder, may be an important factor in the final breakdown. This may be, and often is, associated with fibrotic contracture at the neck of the bladder, lessening the facility with which it relaxes to permit the outflow

of urine, and thus disturbing the balance of the expulsive mechanism of the bladder and leading to the development of mechanism of the bas fond and the formation of a retroprostatic pouching of the bas fond and the formation of a retroprostatic ip or bar As a part of this process, the prostate also presents a relative increase in its fibrous elements, with or without glandu lar increase, and adds its element of obstruction to the complex of conditions Whatever the special condition present, the dominating feature of all these cases is urmary obstruction Whenever this is present to a degree that materially interferes with the comfort of the individual, or entails notable disability, if examination shows that the bladder never wholly emoties itself, and especially when crises of complete retention have occurred, all of which are reasonably traceable to prostatic obstruction, then it would seem as if indications enough had been presented to justify resort to prostatectomy

Shall not the use of the catheter first be tried? Certainly as a temporary resort, but in the light of present experience always rather under protest than as a measure possessing the full recommendation of the surgeon

Doubtless in many cases operation on the first appearance of serious obstructive symptoms will be impracticable, either through the disinclination of the patient to submit to such an operation as prostatectomy, or his inability to give up from his occupation the time required for its performance and recovery thereupon, provided the use of the catheter is found to be un attended with any special trouble or discomfort, nevertheless, it is impossible to emphasize too much the great difference in the risks, both as regards danger to life and probable per fection of cure, of operations done early before the inevitable bladder, ureteral, and kidney infections have developed, the sure ultimate consequences of the use of the catheter, and of those which have to be done as a last resort in the presence of some or all of these conditions

The particular indication for prostatectomy to day, therefore, is a degree of urinary obstruction that interferes materially with comfort or entails notable disability, which examination demonstrates with reasonable certainty to be due to enlargement of the prostate or to fibrotic changes in its texture.

Prostatic dysuria declared, the question of contraindications to operation must rather be the ones for consideration, if such exist, which may outweigh or modify the primarily dominating indication.

Great age, if with it catheterization be facile and comfortable, might properly be a reason for resort to the catheter during the brief period of life remaining, rather than subject the patient to the special immediate hazards of operation.

Great age, however, is a very relative term; many men are older at seventy than others at eighty. Septuagenarians and octogenarians often bear operations well, if they are not subjected to too much loss of blood, and are soon gotten out of bed. In my own experience, one of the most satisfactory results was obtained in a gentleman of eighty-four years, from whom a median and unilateral mass weighing two and a half ounces was enucleated. Twice I have removed the prostate from men of seventy-eight years with happy issue. In eight other cases, whose ages ranged from seventy-one to seventy-four years (seventy-one, seventy-two, seventy-two, seventy-two, seventy-two, seventy-three, seventy-three, seventy-four), the course of recovery has been equally smooth, with the exception of one case in which death quickly followed operation from postoperative pulmonary congestion. On the other hand, the only other death in the whole series was in the person of the youngest patient of all, a man fiftyseven years of age, who died uræmic on the seventh day after operation.

Advanced kidney lesions are the most frequent conditions that may contraindicate any serious operative procedure, requiring the surgeon to be content with the continued use of the catheter, if practicable, or, if not, with a rapidly executed suprapubic section for drainage, under cocaine.

Profound general depression resulting from prolonged suffering, loss of sleep, and septic absorption may contraindicate prostatectomy. In some cases a proper combination of drainage, perineal or suprapubic, with bladder irrigations, the removal of calculi, if present, urinary antisepsis, sedatives, and general hygiene, may so improve the general and local state of such patients as to make later prostatectomy possible and curative

Any of the conditions of the other organs or of the general state of the body which are recognized by surgeons in general as contraindications to operations must be taken into the account when considering the surgery of the prostate, and given that weight which all the circumstances indicate

TREATMENT PRELIMINARY TO OPERATION—Prostatectomy is not an operation of emergency, and should be preceded in all cases by those general cares accepted in all scrious surgical work as desirable to secure the best state of bodily vigor. Sleep should be secured by opiates if needed. The digestive tract should be cleansed and regulated by suitable aperients and diet, the kidneys should be flushed by copious draughts of water, the skin should be depurated and cleansed by hot baths, the bladder should be drained by a retained catheter and its mucous membrane treated by accepted methods. The urine should be made antiseptic by the administration of urotropin in half gramme (7½ grains) doses four times daily. The rectum should finally be empited by an enema administered nine or ten hours before the hour set for the operation.

Whether cystoscopic examinations of the bladder shall be made or not will depend very much on the habit and per sonal prepossession of the surgeon. It is denounced by many operators as an unnecessary tax upon the endurance of the patient, liable to aggravate the local prostatic and bladder irritation, and giving no information that cannot be better obtained in the course of the operation the necessity for which it is claimed by its advocates to be capable of giving very important information needed for the guidance of the operator

The sympathies of the writer are with those who deprecate the routine use of the cystoscope in these cases

CHOICE OF OPERATION.—In operating for prostatic dysuria, the problem which the surgeon has to solve is not only to thoroughly remove the obstruction, but to do it without undue prolongation of manipulation and with as little loss of blood as possible, and with a minimum amount of injury to the urethra, bladder, rectum, and ejaculatory ducts, thereby lessening mortality and subsequent infirmities. At the present time three methods of attack present themselves for choice: 1. Through the bladder by means of a suprapubic section; 2. By the perineum through a limited longitudinal median incision carried into the capsule of the prostate. In both of these methods enucleation of prostatic masses is effected by fingertip dissection unaided by sight; 3. By the perineum through a free transversely curved incision, through which the prostate is fully exposed, followed by systematic incision into its substance, and subsequent enucleations largely under the guidance of the eve.

In the first two methods named the amount of time required in the manipulation, in favorable cases, is distinctly less, and it is conceivable that in some cases this indication of quickness of execution may determine the choice. Cases characterized by massive gland hypertrophy are the most favorable for the transvesical method; those in which the hypertrophy is moderate lend themselves better to one of the perineal methods; those in which there is a marked fibrotic element in the prostatic change always require for their satisfactory management recourse to the most open method of attack possible. Cases in which a suprapubic opening has already been made for the removal of calculi or clots, or for bladder drainage, and in which a well-marked intravesical projecting mass is felt, will naturally invite attack through the bladder. absence of any important indication to preserve the ejaculatory ducts, should be so treated. Cases with massive intravesical growth, and in which the use of a general anæsthetic is contraindicated,—as in certain renal and cardiac conditions,—but in which operation may still be justifiable under spinal cocainization, may better be attacked through the bladder. A hard

fibrotic prostate should not be subjected to any form of pros tatectomy under such conditions, but in such a complex of conditions the Bottim method of galvanocautery incision would find its special field. In the great majority of cases, however, there will be nothing to prevent the surgeon from resorting to such method of procedure as in his judgment will best satisfy all the requirements of an ideal operation. In the earlier sec tions of this paper, the writer has attempted to critically ex amine the operative indications which prostatic dysuria pre sents He will not attempt to again marshal them here, even in review, but will content himself with the statement of his conviction from their study that, as a rule, for the best fulfil ment of all the operative indications, there is necessary the free exposure of the gland by suitable perineal incision, the exposed gland should be brought down as much as possible into the superficial operative field by the use of suitable trac tors, and the removal of the obstructing masses should be carefully and systematically effected under the guidance of the eye as much as possible. There is surely nothing in the special conditions of the prostate to take its surgery out of the application of that tenet of general surgery which de mands the adequate exposure of the affected part as the first step of any attack upon it. That the additional time which this method of procedure takes adds but little, if anything, to the hazards of the operation, experience has already fully demonstrated (vide the mortality tables given on page 566), while it will add very much to the definiteness and certainty of the result

Choice of Anasthetic - In general, chloroform is to be preferred as the general anæsthetic of the aged, on account of the less tendency to bronchial irritation and pulmonary con gestion which follows its use. In cases in which even chloroform is manifestly extra hazardous, it has been shown by Wiener that operation through the bladder may be done with safety under nitrous oxide gas arresthesia

^{*} Young Permeal Prostatectomy Journal of the American Medical Association February 4 1005

reported ten cases in which perineal prostatectomy has been readily effected by the use of spinal cocainization, without any unpleasant sequelæ in any case, and Tinker * has demonstrated in two instances the feasibility of removing a hypertrophied prostate under local anæsthesia by tissue infiltration with solution of eucain and adrenalin.

TECHNIQUE OF THE PERINEAL OPERATION RECOM-MENDED.—a. Before the Incision.—The patient is placed on a firm table in an exaggerated lithotomy position, the pelvis elevated, by sand bags or other special supports, to a degree that will bring the plane of the perineum as near horizontal as possible (Fig. 2). The rectum should have been emptied by an enema administered at least eight hours before the hour of operation, and now should require no attention. scrotum, perineum, and adjacent thigh surfaces having previously been shaved and cleaned, should again be scrubbed and disinfected after the patient has been placed in position. full-sized sound, No. 26-30 (French), should now be introduced through the urethra into the bladder and held by an assistant. Should any strictures in the anterior urethra be detected, they should be freely divided by urethrotome at this time. The sound in the urethra should not be made to project into the perineum, but should be raised so as to bring the membranous urethra as close as possible to the pubic arch and increase the distance between the urethra and the rectum (Proust).

- b. The Primary Incision.—A curved incision through skin and superficial fascia is then made, distant an inch to an inch and a half in front of the anus and extending from ischium to ischium (Fig. 3).
- c. The Exposure of the Recto-urethral Muscle.—This is a step of the highest importance, since this semi-aponeurotic muscle is the only real barrier in the way of free access to the

^{*}Tinker. Bloodless Perineal Prostatectomy under Local Anæsthesia. Journal of the American Medical Association, February 11, 1905, p. 471.



Fig. 2 —Perineal prostatectomy. Patient in position for operation staff in urethra held by assistant



Fig. 3—Perineal prostatectomy — The primary incision



FIG. 4—Perincal prostatectoms. Delimitation of the bulb. (Photograph taken after removal of prostate and the bulb permitted to drop back into place.)

		•	
	9		

periprostatic space By its prolongation anteriorly the membranous urethra is swung from the pubic arch and its main portion, inserted into the anterior wall of the rectum above the internal sphincter, draws that portion of the rectum forward towards the urethra, in many instances in the aged the bulb is so enlarged (Fig I) that its backward projection is sufficient to cover entirely the space between rectum and urethra The delimitation of the builb is quickly accomplished after the division of the ano-bulbar raphe (Fig 4) The bulb is then drawn forward in the grasp of a forceps until the membranous urethra is identified, distended as it is by the sound that fills it, but obscured by the recto-urethralis muscle As the bulb is drawn forward the posterior edge of the transverse perineal muscle, on each side, is made tense and identifiable, and is a guide to the location of the artery of the bulb which is to be avoided Just behind these transverse perineal fibres and vessels to the outer side of the urethra is a weak spot in the deep perineal fascia through which the tip of the finger can readily be made to bore, and to penetrate alongside the membranous urethra even back to the prostate The finger-tips thrust in at this point pressing outward and backward towards the ichia quickly opens up these lateral spaces, into which suitable retractors are at once placed

d The Exposure of the Prostate—The detachment of the recto urethral fibres from the face of the membranous urethra is now readily effected, guided by the eye and aided by snips of the scissors or touches of the kinfe, but for the most part bluntly done by the finger—The rectum, now freed from its anterior attachments, is pushed backward, the connective tissue about the urethra and the face of the prostate is readily detached and rolled back by the finger-tips until the rectoprostatic interspace is penetrated as deeply as the conditions may require—A broad, blunt-edged retractor is adjusted so as to keep the rectum drawn back from the field, and, with the assistance of the lateral retractors already placed, the prostate is fully exposed—The description of the operative steps thus far may have seemed long, but the work itself

advances steadily from point to point, and does not take much time for its accomplishment. (In the experience of the writer from ten to twelve minutes.)

e. The Downward Traction of the Prostate.—The prostate may be forced down towards the perineal surface by strong counterpressure from above the pubis, or it may be seized by suitable traction forceps introduced through the perineal wound and dragged down so as to be more accessible to attack; but greater advantages are possessed by forms of tractors which are introduced through the urethra into the bladder and by expansion or unfolding of intravesical blades furnish a mechanism whereby strong traction can be exercised upon the base of the bladder. Such are the tractors of Lydston, Syms, de Pezzer, and Young. Of these I have used with great satisfaction the model devised by Young. The time for its introduction is after the prostate has been fully exposed as described in the preceding paragraph. The membranous urethra is also fully exposed in the wound, distended by the sound, which now serves as a guide by which to incise the prostatic urethra, beginning at the apex of the gland and extending the incision as far backward as may be necessary to give room for the ready introduction of the rather blunt and clumsy beak of the tractor. After the incision has been made, the sound is withdrawn, the edges of the incision are held apart by tenacula or loops of thread that have been inserted into them, and the tractor passed through the prostatic urethra into the bladder. Its blades are then rotated so as to form two divergent wings within the bladder, by means of which later traction is made as required with a minimum of injury to the mucous membrane of the bladder. Such an instrument is more than a tractor; it is practically an elongated finger by means of which the operator can appreciate to a notable degree the conditions within the bladder, can make such graduated counterpressure as he may require to facilitate the progress of his enucleation, and can gauge the extent and progress of his work at any time. It contributes to a notable degree to the positiveness and accuracy of the work.



Fig. 5—Per neal prostate con y. The prostate exposed the m or n in d u ed to pull down the prostate the primary nelson in the pn in the

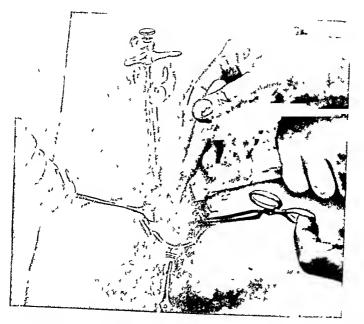
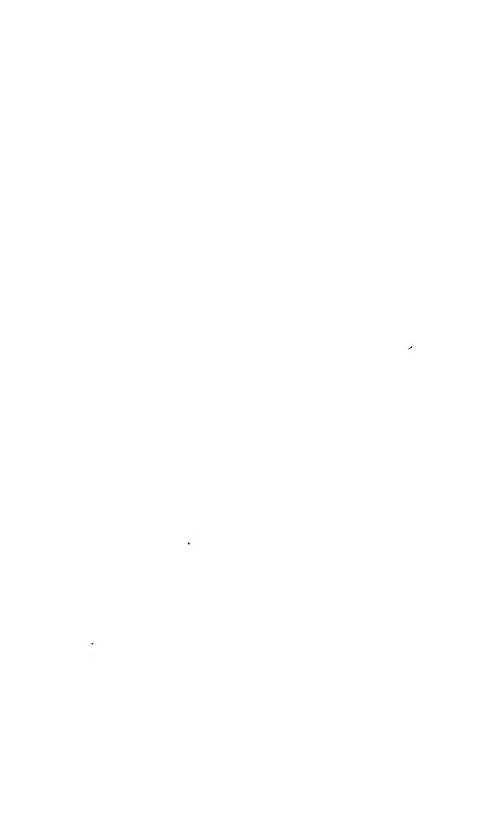


Fig 6 -Perineal prostatectomy. Enucleation of hypertrophied mass by blunt dissector.



Fig 7-Perineal prostatectomy Wound sutured bladder dra n-tube placed



f Enucleation of the Hypertrophied Masses -To effect this, I have found the technique described by Young very satisfactory The prostate having been brought into good exposure, two free longitudinal meisions are then made through the capsule to a depth of about one and a half centimetres into the substance of the gland (Fig. 5), one on either side of the urethra These are about one and a half centimetres apart in front and diverge slightly as they pass backward bridge of tissue that lies between them supports the urethra and contains the ejaculatory ducts. The outer edge of one of the wounds in the capsule is then seized with tissue forceps to steady it, and a blunt dissector entered in the line of eleavage that presents, with this the mass in the lateral lobe is readily enucleated anteriorly and externally (Fig 6), the partially turned out mass can now be seized with a suitable traction forcers and pulled upon to facilitate the separation of the deeper portion. The finger tip may now be substi-tuted for the blunt dissector as the enucleation extends into a region beyond the control of the eye As that portion of the mass is reached which hes adjacent to the urethra, it should be separated with especial care to avoid tearing the urethra, the blunt dissector, the touch of the knife point, or a snip of the scissors may be required to divide the hands of tissue that may unite it to the urethral wall. The other lateral mass is then removed in the same manner. The presence of a median lobe is then readily determined by the conjoined manipulation of the finger tip in the lateral prostatic cavities and the tractor in the bladder, and if present may usually be brought down into reach of the enucleating finger with marked case by the pressure of the suitably placed intravesical blades of the tractor, and is freed and turned out through one of these lateral spaces, without injury to the bladder and in many cases, it is believed, without injury to the ejaculatory ducts If palpation reveals now the further presence of a mass of hypertrophy in the posterior median bridge yet left, it can be exposed by transverse incision and enucleated, but probably such removal would entail cutting across the ejaculatory ducts. In the relatively small, hard, fibrotic prostates, the enucleation of great masses is not possible; some small glandular nodules may be present and readily turned out, but for the removal of the greater part of each lobe there is required a piecemeal excision by traction forceps and scissors.

The operator will be able to determine with great facility and accuracy the thickness of the tissue intervening between the depth of his dissection and the cavity of the bladder by the tip of his finger in the wound pressed against the broad blades of the tractor in the bladder. By the tractor also, used as a searcher, for which its shape well fits it, the question of the presence of calculi in the bladder will be determined. If a calculus is present, the prostatic urethra must be dilated sufficiently to permit of the introduction of the instruments required for its removal.

In cases of fibrotic contracture of the internal meatus, a free incision of the floor of the prostatic urethra through the ring at the internal meatus into the bladder should be made.

If a pedunculated median intravesical growth is found that cannot readily be everted into a lateral cavity, the prostatic urethra should be incised backward sufficiently to allow of the tumor being caught and brought out into the urethral wound and cut away.

g. The Primary Wound Dressing.—The tractor having been withdrawn, its blades having been first closed, the bladder should be well washed out to free it of any clots that may have formed in it. In most of my cases I have then introduced into the bladder a large-sized—No. 30—soft-rubber catheter throughout the urethra from the meatus externus and tied it in; this to remain for a week as a mould for the more surely obtaining the best reconstitution of the urethra. Around this I have brought the periurethral tissues by several points of chromic-gut suture. This catheter having been removed on the seventh day, a No. 26 sound was passed on the third day after its removal, and twice a week for the ensuing two weeks, after which further instrumentation was suspended. In cases

complicated by much cystitis, such irrigations and intravesical medication as the case demanded were readily given through this catheter a demeure. In addition, a tampon of iodoform rauze and a short tube drain of rubber were laid in the perineal wound to the deepest part of the wound cavity. These were removed on the fifth day, and the wound cavity well irrigated and then left to contract The lateral wound spaces were brought together by some points of deeply placed chromic suture, and the external wound closed over about one half its extent by several points of silkworm gut suture. The results following this method of after treatment have been highly satisfactory The perineal wounds have rapidly closed, no permanent fistule, other than the one case of recto-urethral fistula already noted have remained the ability of the bladder to retain and expel at due intervals its contents has early been regained with the reservation as to some temporary defects in retention described in a preceding page, and no stricture of the urethra, that I am aware of has developed. In my last three cases, Cases XXI XXII, and XXIII however, instead of the catheter a demeure. I have simply placed a large rubber drain tube through the opening in the prostatic urethra into the bladder and secured its outer end at one nigle of the external perinerl wound (Fig. 7) by a point of suture at the same time laying an iodoform gauze tampon into the depth of the permeal wound. The tampon was removed on the fifth day, the bladder drain tube on the seventh day when, after an irrigation of the bladder and urethra a sound was passed through meatus and urethra into bladder. The later history of these cases has been quite as favorable as those that preceded them and as the method is more simple and less irksome to the patient than the preceding one, I am inclined to regard it as to be preferred, unless further experience should show it to be attended with greater hability to the development of distortions or strictures of the urethra

AFTER TREATMENT—a Local—The local cares are very simple being those of any drained wound, plus the provisions for carrying away the unne To the retuined catheter of the

bladder perineal tube drain is attached a sufficient length of rubber tubing to reach a bottle hung at the side of the bed, which receives the urine conveyed through the tube. An absorbent compress to the perineal wound, retained by a T-bandage, completes the dressing. The removal of the gauze tampon on the fifth day, and of the drain or catheter on the seventh day, and the opening of the urethra by sound have already been discussed. Instrumentation applied to the urethra or the wound cavity should be avoided as far as possible, but such a minimum careful use of the sound as is required to assure the surgeon of the continuity and full patency of the urethral canal ought not to be omitted.

The treatment of the complicating cystitis will receive such attention as the condition of the particular patient may determine. In none of my own cases has there seemed to be any indication for continuous irrigation of the bladder after operation.

b. General.—The aged men who are subjected to perineal prostatectomy bear the operation, as a rule, surprisingly well, even though the manipulations seem to be somewhat prolonged. This I take it is due to the little loss of blood that attends the work, and to the elevated position of the pelvis and lower limbs which is maintained during its progress. In the feebler patients, however, a later depression has in some cases manifested itself after their return to bed. This, however, soon responds to the use of heat, hypodermoclysis, and adrenalin.

Renal insufficiency is the chief other contingency to be provided against in the immediate after-care. The best preventive of this has already been supplied in the preoperative copious libations of water. These should be continued after the operation, and in the case of the appearance of deficient amount of renal secretion should be supplemented by rectal enemata, hypodermoclysis, and in the event of its continuance, despite these means, by direct intravenous saline infusion to the extent of 1200 to 1600 cubic centimetres.

RESULTS.—Up to date (February 21, 1905), the writer has removed the prostate gland in twenty-three patients, the

first operation having been done in September, 1902 In this case a restricted median incision was made, and the enuclea tion was conducted by the sense of touch alone. The patient recovered, was relieved from his dysuria, and has led an active life since, but as a surgical operative procedure the method was so unsatisfactory to his sense of good work that in all subsequent cases he has preferred to make use of sufficiently free external incisions to give him an adequate view of the field of work and better control of its various steps. In one case, No XIX of the series the suprapubic transvesical method was resorted to It was in a case of a greatly enfeebled patient, fifty seven years of age, with a massive intravesical protec tion of the hypertroplised prostate multiple calculi and a high grade of cystitis A total enucleation of the whole prostate (Fig. 1, p. 484) was quickly effected after the method of Fuller, and an uncomplicated recovery followed. The remaining twenty one cases have been subjected to the method of perincal attack already described

The ages of the patients were as follows

Over 80 years 1 Between 65 and 70 6
Between 75 and 80 2 Between 70 and 75 8
Between 55 and 60 4

MORTALITY —Two patients died as the result of the operation—one, aged seventy two years from pulmonary conges too within twenty four hours after operation—one, aged fifty seven years, at the end of seven days, from urremia due to progressive renal insufficiency

Relief of Obstruction—Complete* and permanent in all cases except in Case VI a man, fifty nime years of age, with an atome bladder and a contracted fibrotic condition of the internal meatus associated with a moderately enlarged

^{*} Further exam nation of these patients rught require some qualification of his statement as to its absoluteness in some cases by revealing a mild degree of residual turne. Subjectively however from the stand point of the patients sensations it is correct for they feel that they now execute their bladders as well as ever

dense fibrotic prostate. When operated, he had a residual urine of thirty-two ounces. Six months later he still had eight ounces of residual urine, and was using a catheter twice daily.

Fistulæ.—A persistent recto-urethral fistula remained in Case XI. This has already been remarked upon (see p. 571). In Case VII, a man of seventy-eight years of age, who was an exceedingly intractable patient and would not permit any bladder drain to be retained in the wound, was finally discharged from hospital with perineal wound soundly healed and with normal urination per urethram. Six months later there developed a perineal abscess followed by a perineal urinary fistula, which was successfully operated upon by Dr. J. B. Roberts, of Philadelphia. In all other cases sound and complete wound healing has followed.

EPIDIDYMITIS.—A transient epididymitis occurred in the after-course of the case in six instances. In two cases this epididymal infection terminated in suppuration (see p. 570).

Continence of Urine.—The control of the bladder sphincters so as to prevent the involuntary escape of urine has been regained in great measure within from ten to twenty days after operation. Some weakness of the sphincters, resulting in slight leakage, if the patient cannot at once respond to a sense of need to empty the bladder, has continued to manifest itself for some months in some cases, but has gradually given way to normal control in most of the cases. In at least two instances, however, this sphincter weakness has in some degree continued permanently, but has entailed an infirmity so greatly less than the pre-existing dysuria that the patients bear it cheerfully and gratefully.

Conclusion.—These results have given me the highest satisfaction. They have fully equalled the expectations which the representations of other surgeons as to their experience in the work had created, and have definitely settled in my mind the conviction that at last surgery had to offer to the unfortunate and aged "prostatic" a fairly safe and reasonably cer-

REMOVAL OF THE HYPERTROPHIED PROSTATE. 589 tain means of relief. In the light of present experience and after as full a consideration of the anatomical and pathological conditions involved as I have been able to make, I am inclined to the conclusion that, as a rule, for the removal of the hyper trophied prostate, the method of free curved transverse perineal incision, with full exposure of the gland in the wound

of operation, is to be preferred

A STUDY OF VARIOUS FORMS OF PROSTATIC HYPERTROPHY FROM POST-MORTEM SPECIMENS AND BY THE CYSTOSCOPE, WITH REFERENCE TO OPERATION.

BY JOHN H. CUNNINGHAM, JR., M.D.,

OF BOSTON, MASS.,

Visiting Surgeon to the Long Island Hospital, Boston, Mass.

The increasing amount of interest directed towards the prostate with reference to operative treatment, either by the galvanocautery instruments or by the partial or complete enucleation methods, through the perineum, over the pubes, or both routes combined, requires as much knowledge of the gland as possible for the purpose of choosing one or the other of these various operative methods.

Watson ("Treatment of the Hypertrophied Prostate," 1888) pointed out that it was possible to enucleate two-thirds of all hypertrophied prostates through the perineal route alone; the remaining third, because of an elongated prostatic urethra caused by intravesical growth or large median lobe hypertrophy, was best removed over the pubes or by the combined suprapubic and perineal route.

Since this time certain tractors—de Pezzer's, Syms's, Delbet's, Lydston's, Young's, and Packard's, by which the gland is rendered more accessible through the perineal incision,—have made a larger proportion of the cases suitable for perineal enucleation.

Despite the fact that a large proportion of the hypertrophied glands may be removed through the perineal incision, there are still strong advocates of the suprapubic route. Freyer (Lancet, 1904, clavii, p. 197) demonstrates conclusively that the time-honored operation of Belfield and McGill still preserves its usefulness. Likewise does Alexander (New York Medical Record, 1894) give evidence that the combined opera-

tion is followed by good results Freudenberg (Deutsch med Zeit, 1900, Nos I to 6) presents convincing evidence in favor of the Bottini operation, while White (Annals of Sugarr, 1904, Vol xl, p 782) shows that castration still has a following With so decisive a difference of opinion between foremost surgeons of the world in this branch of surgery, it is obvious that we have not as yet become convinced that there is a single operative procedure par excellence

That this difference of opinion should exist may be grounded upon the operative skill of the different surgeons with regard to the special methods with which they are familiar. It may be true, also, that the successful cases operated by any of the various methods would do equally well by another method, or it may indicate that no one operative procedure is suitable for all cases.

The preference of the perineal route by Albarran, Proust, and other Frenchmen, supported by Gouley, Watson, Goodfellow, and others in America, while the English maintain a preference for the suprapulor route, resembles not a little the controversy over the high and the low cutting for stone in the early part of the eighteenth century

If there is to be further progress in treating the malady, hypertrophied prostate, it seems to the writer that it will depend not only upon the publications of results by the different operative methods, but also by studies of the forms of the hypertrophies with a hope of determining which of the already perfected methods are to be chosen, and if no one appears suitable for the majority of cases, which should be chosen in any given case. It is with this in view that the following study and facts are presented

Keyes ("Gento Urmary Diseases," 1903, p 253), in considering the cases recorded by Thompson, Predal, Desnos, Motz, and Watson, concludes that eighty four out of every 100 cases of prostatic hypertrophy may be diagnosed by rectal palpation. He does not, however, by this means attempt to distinguish the part or parts of the gland which cause the obstruction, which fact may be the important element to be

considered in choosing one or another method of operative treatment.

The relative frequency of the enlargement of the different portions of the prostate has been recalled by Thompson, Dittel, Watson, and others. The form of the growth varies, and the different varieties occur in the order of frequency, as follows:

1. An enlargement of the two lateral lobes, together with an enlargement of the so-called third, or middle, lobe.

2. Enlargement of the median lobe alone.

3. Enlargement of the lateral lobes alone.

4. Enlargement of the median and one lateral lobe.

5. Growths occurring in the form of independent, discrete tumor nodules, situated most frequently along the course of the prostatic urethra, and less commonly on the vesical surface of the gland. There may be hyperplasia of the prostatic tissue, so as to produce a combination of any of the abovementioned conditions. They are, however, but combinations of the above conditions and hardly justify further classification.

The cystoscope is the only means by which the exact character of the obstruction may be learned, and while perhaps it is more commonly used to determine whether or not the given gland is suitable for the Bottini operation, it also serves as an important means by which the intravesical character of the gland may be studied, and thereby determine the nature of the obstruction and aid in determining which route should be employed in a more radical operation.

The interpretation of the size, shape, and contour of the gland, and the character of the vesical orifice, requires more experience for correct interpretation than probably any other given element in the field of cystoscopy. An exact knowledge of the topography of the prostate, for performing the Bottini or the more uncommon galvanocautery operations, is the fundamental step in the procedure, without an exact knowledge of which these operations are not only dangerous, but unjustifiable.

THE CYSTOSCOPIC INSTRUMENTS.

No mention will be made of the simple direct convex diagnostic cystoscopes or those employing air as the examining

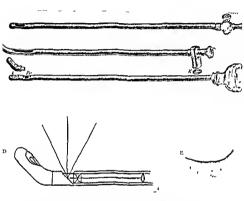


Fig. 1 -Kolimann & Simple Indirect Concave Diagnostic Cystoscope

A The irrigating tube introduced into the sheath B during the introduction of the sheath into the bladder and through which the bladder is irrigated

and the posture and through which the answer is irrigated.

B. Sheath which contains the irrigating thebe. A during introduction and which receives the cystoscope. C with the straight lamp. The device K at the proximal end is a slid ng valve for the purpose of holding the examining medium in the bladder during the removal of the irrigating tube. A and the insertion of the straight cystoscope. C

C Shows the cystoscope fitted with the straight lamp for use within the above is a cane beak which it secured into the shaft where the bladder urme in carried on through a catheter D Shows the optics of the sample cystoscope. The field of vision is at a right angle to the long axis of the instrument shaft.

E Shows a single evstoscopic field of a normal prostate

medium, experience having proven them inferior to the simple indirect concave diagnostic instruments and the retrograde cystoscopes using water as the distending medium

The principles and advantages of the cystoscopes best adapted for the diagnosis of prostatic hypertrophy will be briefly mentioned

With the Simple Concave or Indirect Diagnostic Cysto scope, the field of vision is at right angles to the long axis of the instrument's shaft, the light being deficited minety degrees by the large rectangular prism forming the window (Fig. 1). The posterior and lateral walls of the bladder are easily examined, but to view the anterior wall the ocular end of the cystoscope must be depressed as far as possible, and to bring the base and vesical outlet into view the instrument must be withdrawn until the prism is on the edge of the vesical orifice. By keeping the window of the cystoscope on this level, depressing and elevating the ocular end of the instrument, and at the same time rotating the beak, pushing it inward and drawing it outward, the whole of the prostate may be inspected.

No one of the simple concave indirect diagnostic cysto scopes is especially adapted for the study of the prostate. The simple cystoscope of the Nitze or Leiter pattern is perhaps, on the whole, less desirable than those possessing in addition an irrigating sheath, which may be used if the presence of blood or pus necessitates a rapid examination, or if there is difficulty in passing an instrument into the bladder

An instrument of this sort is Kollmann's (Fig. 1) (Cent f d krankh d Harn n Sev Org, Leipzig, 1900, xl, 393-402, and Cent f Chir, Leipzig, 1900, xxli, 1058-1060) This instrument, antedated in principle by Gueterbock, and fol lowed in principle by a Nitze instrument and a cystoscope by Lang, combines the simple cystoscope with the most satisfactory arrangement for removing and replacing the examining medium, and for irrigating the bladder in those cases in which it is especially foul or difficult to instrument

The Retrograde Cystoscopes —Nitze, in his cystoscopic production of 1887, considered it necessary to have three in

struments for the purpose of rendering possible a complete visual examination of the bladder. These instruments are known as the Nitze cystoscope, No. 1, No. 2, and No. 3. The No. 1 has the lamp and prism on the concave surface, and has served as a model for the simple diagnostic cystoscopes of to-day. The No. 2 has the lamp and prism on the convex surface, and was for the purpose of examining the bladder fundus. This instrument does not concern us. Suffice it to say that it never had any practical value, the No. 1 instrument accomplishing the purpose for which the No. 2 cystoscope was intended.

Nitze's No. 3 cystoscope (Fig. 2) was intended by him to be a retrograde cystoscope, that is, to look directly backward towards the operator, bringing into view the base of the bladder and the vesical outlet. This instrument was the first of the retrograde cystoscopes, and fails, as a desirable instrument for examinations of the prostate and vesical outlet, because the visual arc falls short of the instrument's shaft, thereby giving no landmark for orientation.

Nitze, after the appearance of the retrograde cystoscopes of Young and Schlagintweit, produced another retrograde cystoscope involving the principle of the latter's instrument. By placing the beak at a nearer right angle with the shaft, the visual arc is made to include the edge of the instrument's shaft (Fig. 3).

Young, in 1900 (a date prior to the second Nitze and the Schlagintweit retrograde cystoscopes), designed, and had constructed by Hirschmann, a retrograde cystoscope, which, employing a double prism with two reflecting surfaces, enabled the operator to look directly backward onto the instrument's shaft (Fig. 4). (Meeting of the American Association of Genito-Urinary Surgeons, May, 1893.) Objection has been made to the hump on the convexity at the site of the lens, and the instrument has not found general favor.

The instrument which is unique in the class of retrograde cystoscopes is the Schlagintweit instrument (Ann. d. Mal. d. Organ. Genito-Urin., Paris, 1803, xxi, 874-980). It is con-

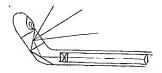


Fig. 2 -\itze \o 3 Retrograde Cystoscope of the 1887 pattern

Note that the beak is at an almost right angle with the shaft of the instrument $\sum_{i \in a} a_{i,0}$ that the field of vision does not include the instrument is shaft. The image after passing through the prism is deflected backward by a mirror (m).

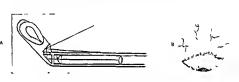


Fig 3-\nze s new Retrograde Cystoscope

- A Note that the field of vis on includes the instrument's shatt. Note that to accomplish this two prisms are employed.
- B The cystoscopic field Note the shalt of the instrument at the lower edge of the field above the prostate and above that the bladder wall

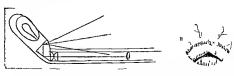


Fig. 4 Young's Retrograde Cystoscope

- A Note that the instrument's shaft is within the field of vision and that this is accomplished by a single prism with two reflecting surfaces. Note the clumsy hump made by the prism.
- B A cystoscopic field The shaft of the instrument seen at the lower edge above prostate and bladder wall

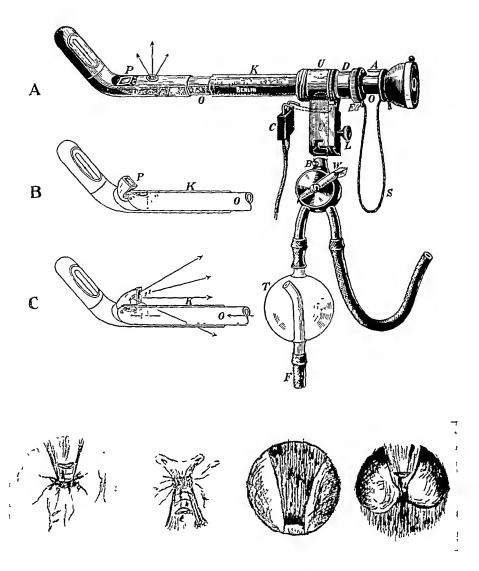


Fig. 5.—Schlagintweit's Retrograde Cystoscope.

- A. Represents the instrument as a whole; the prism (P) being within the shaft makes the instrument essentially a simple, indirect diagnostic cystoscope.
 - B. Shows the prism (P) partially forced out of the shaft.
- C. Shows the prism (P) in position to examine the vesical outlet and vesical surface of the prostate and bladder base.

D. In the first two figures the shaft of the instrument is visible, presenting through the bladder orifice; the prism being high within the bladder, the base of the viscus is evident. In the second two pictures the shaft is also visible, but the prism being nearer the vesical outlet the prostate occupies the field of vision.

structed upon a fundamental plan which is common to the new cystoscopes of Reiniger, Gibbert, and Schall for the ureter and electrolytic operations (Fig. 5)

Retrograde views with this instrument are rendered possible by a reflecting prism $(p, \operatorname{Fig}\ 5, A)$, which is constructed upon a movable joint at the extremity of the optic tube (o), which tube glides into the interior of the outer tube (k) By pushing forward the tube (o), the prism (p) is thrown up forward, and assumes the position as in Figs 5, B and C. The rays are transferred for a second time perpendicularly, so that one sees in the direction held by the shaft, that is, directly backward. By drawing back the optic tube (o), so that the prism is in the position as in Fig 5, A, the instrument may be used as any ordinary, simple, diagnostic cystoscope

The section containing the bulb (T), with the neck piece (A), is attached to the shoulder (U), and the optic tube being withdrawn to the exterior of the cord (S) allows the fluid from the bladder to run out into the bulb (T) when the valve is opened by the lever (IF) Irrigation through the tube (I) from a reservoir is alternated with evacuation into the bulb (T) by turning the lever alternately one way or the other

The optic tube being returned to a position for an ordinary or retrograde view, the attachment with the battery is made through the electrical plugs (C) by placing them in position as indicated in Fig. 5, A

None of the retrograde cystoscopes can be commended as accomplishing all that might be desired In order to bring all parts of the vesical orifices into view, these instruments must be made to assume from four to eight different positions, and in this they possess no advantage over the simple cystoscopes. The images received by the eye are inverted, and, as with the simple cystoscope, must be transposed by the examiner before the actual shape of the bladder outlet is pictured. Again, a large intravesical projection cannot be seen as a whole, and the interpretation of the fields necessary to cover it are more difficult to compile than are the images received when employing the simple cystoscope. The optics of the retrograde cystoscopes

being more complicated than those of the simple diagnostic instruments, render the object less distinct, much light being lost by the double reflection through the two large prisms.

It is necessary in every examination to employ a simple diagnostic cystoscope to study the bladder. Schlagintweit, appreciating this fact, and also the inconveniences of having both a retrograde and a simple cystoscope ready for each examination, has ingeniously embodied both principles in one instrument, as already noted. This combined instrument, however, when used as a simple diagnostic cystoscope, is less satisfactory than one of the regular simple cystoscopes because of its complicated optics, whereby much light is absorbed in the transmission of the object. The mechanics of the Schlagintweit instrument, although not unnecessarily complicated, still possess delicate features which get out of order easily. This is especially true of the sliding prism.

Suprapubic Cystoscopes.—There is a small class of cases in which it is impossible to make the simple cystoscope enter the bladder. Prostates which bleed sufficiently to continually smear the window of the cystoscope in its passage, and in which cases it is necessary to learn the contour of the gland in anticipation of a Bottini operation or otherwise, suprapubic cystotomy may be indicated.

Kennedy, in 1894 (New York Medical Record, 1902, lxi, p. 610), devised a suprapubic cystoscope which consisted of a large trocar made to fit a 21 F. Otis endoscope. The bladder was emptied through the trocar and washed clean. A lamp was attached to the endoscope tube and, while the bladder was empty, its surface was examined.

Kraske, in 1902 (Cent. f. Chirurg., Leipzig, 1803, xxix, 153-155), describes examinations of the bladder through suprapubic fistulæ which sometimes exist after suprapubic operations. The information gained in this manner caused him to make a trocar cystoscope, which he used in the class of cases already spoken of.

Soon after the appearance of Dr. Kraske's article, Fenwick published (British Medical Journal, March 29, 1902, p.

, F.

772), referring to his work upon the subject ten years previously, and the suprapubic cystoscope which he devised for the purpose at that time ("Epitome of Urinary Surgery," 1894, p 82) (Fig 6)

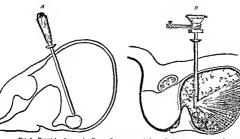


Fig 6-Fenwick's Suprapulse Trocar Cystoscope A shows the trocar in position and the method of sound ng the dar fond with a blunt p lot B shows the cyttoscope introduced through the trocar cannols

In this class of cases where the enlargement of the pros tate is so obstructive or vascular, and where symptoms lead one to believe that a stone may be situated in a deep bas fond, suprapubic sounding and cystoscopy through a cannula, as advised by Fenwick, are indicated with local anæsthesia trocar and cannula are made to enter the distended bladder through the space of Ritzius The trocar, being removed from the cannula, is replaced by a loosely fitting, blunt instrument, by means of which the bas fond may be sounded for stone

The cystoscope can be introduced, through the cannula, into the bladder, which may be examined after having been cleaned and distended with clear water. In such cases in which suprapulic sounding and cystoscopy revealing stone, new growths, or prostatic conditions requiring suprapubic cyst otomy, the trocar may serve as a director in performing the operation

The information gained by suprapubic sounding and cystoscopy averts the more serious procedure of suprapubic cystotomy as an exploratory measure, and, considering that the indications for such procedures are in the aged, in the majority of cases, the importance of suprapubic cystoscopy is obvious.

The interpretation of the picture which is revealed by suprapubic cystoscopy will at first be difficult to those familiar with the examination through the urethra. Although one may search directly for such landmarks as the bladder outlet, the trigone, and the ureteral orifices, their appearance from a different point of view is not always easy to recognize.

THE STEPS IN THE EXAMINATION AND THE POINTS TO BE DETERMINED BY THE EXAMINATION.

The prostatic urethra is a pliable tube which may be altered in its length, size, and shape. Such changes are demonstrable by three distinct steps in the examination: (1) The passage of the cystoscope into the bladder; (2) observing the appearance of the bladder outlet, and (3) by bimanual examination with the cystoscope, or the writer's special instrument, in the bladder and the finger in the rectum.

The study of the prostate by the cystoscope should in each case be directed towards learning the various points, as follows: I. The obstructing portion of the gland. (Nodulous growths projecting into the prostatic urethra; compression of the prostatic urethra by one or both lateral lobes; by a middle lobe; or by any combination of these together.) 2. The condition of the remaining portion of the bladder and the ureteral orifices. 3. The comparative size of the various lobes, especially those producing the obstruction. 4. The length of the prostatic urethra.

These points are best gained by the simple, concave, indirect diagnostic cystoscope with a Mercier beak, although it may be of occasional interest to use one of the retrograde instruments, especially Schlagintweit's, to study the topography of the vesical surface of the gland. It is less frequently of

advantage to use one of the irrigating cystoscopes because of foul cystitis In such instances an instrument of the Kollmann type is to be preferred to the ordinary irrigating cystoscopes, the irrigating tubes of which are too small to be of service in removing the foul material When the cystoscope cannot be made to enter the bladder, or when bleeding occurs from such attempts, it becomes necessary, in certain cases, to resort to suprapulic cystoscopy, as practised by Fenwick, Kraske, and Kennedy

Taking a case of the largest class, that is, one in which the bladder may be entered and irrigated through a small rubber catheter or coudé, and in which the simple, concave, indirect cystoscope is used to the greatest advantage, we may proceed with the examination, attempting to gain information upon the various points already enumerated

The technique and results remain essentially the same with the retrograde or the irrigating cystoscopes of either type, but in suprapubic cystoscopy only such information is obtained regarding the obstruction as may be shown by intravesical conditions of the prostatic surface and distortions of the bladder outlet

I To Learn the Site of the Obstructing Portion of the Gland -This is accomplished by the three steps in the examination, as follows (1) The passage of the cystoscope into the bladder, (2) observing the appearance of the bladder outlet, (3) bimanual examination with the cystoscope in the bladder and the finger in the rectum

In using either the simple diagnostic, the retrograde, or the irrigating cystoscope of either type fitted with a short Mercier's beak, the instrument is passed to the tip of the prostate The ocular end is then gently depressed as far as possible before the beak will enter the prostatic urethra In cases which have been leading a catheter life, the beak of the instrument will frequently be caught in a urethral pouch behind, or, less frequently, in front of the apex of the prostate, which projects into the urethra, not unlike the cervix into the vagina When this condition is encountered, the succeeding attempts to

enter the bladder should be systematically as follows: with-draw the cystoscope for an inch or two and, depressing the ocular end, make the beak travel on the roof of the urethra. In the majority of cases this will insure a successful result. If, however, it fails, withdraw the instrument again and proceed with the beak on the floor. This failing, another attempt is made, using care to make the tip of the beak strike a point midway between the two previous ones. This failing, the attempts are repeated with great gentleness, carrying the instrument slightly to the right and left, and varying the degree of depression of the ocular end. The finger in the rectum will often facilitate these movements.

The beak having entered the prostatic urethra, the operator holds the instrument by the ocular end, lightly between the thumb and forefinger, and, watching the indicating knob, gently forces the cystoscope through the prostatic urethra, noting any deviation of the beak to the right or left, or any increased resistance, unevenness, or jerks in the course of its passage into the bladder.

Careful observations of these points should give the first suspicions as to the probable condition to be found by inspection. The beak being turned to the right suggests encroachment upon the urethra from the left side, while temporary rotation and increased resistance over a small area during its passage through the prostatic urethra makes the presence of an obstructing nodule most probable. Any such physical signs are confirmed by the visual inspection, and in withdrawing the instrument with the finger in the rectum at the end of the bimanual examination.

The cystoscope being in the bladder, the topography of the vesical surface of the gland is to be studied, and such hypertrophies or distortions of the vesical orifice as are present noted.

Each picture of a single cystoscopic field is but a single inverted segment, which, with the others, will go to make up the composite picture. The result will be more or less accurate according to the examiner's ability to interpret and compile

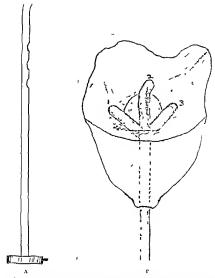


Fig. 7—A. The writer's special instrument for determs a night hength of the prostate arethra. It consists of a two centimetre Merizer beal, a shalf of twenty French which has there depressions one three centimetres from the point of union of the beak with the shalf another facetimetres and another seven centimetres, each depression and interval between being one centimetre in Pingth.

B. The method of determ n ng the height and breadth of the intraves cal projection of the med an lobe. The drawing is from the spec men seen in Plate IV. The instrument is

shalt Further rotation will cruse the beak to assume position 3. The distance from position 1 to position 3 is the width of the lobe and can be more or less accurately estimated by noting the arc through which the beak passes in going from position 1 to position 10 in 3.

the inverted views received in the various fields necessary to cover the whole vesical surface of the gland

While a small sessile or pedunculated middle lobe may appear as a distinct tumor projecting into the bladder, it is unusual that the larger forms of this type of hypertrophy are so easily determined, and even after demonstrating such a lobe, it is unjust to consider it the cause of the obstruction unless other evidence is at hand Likewise the intravesical projection of the lateral lobes, as determined by the shadow cast by them upon the lighter colored bladder wall, is no certainty of their urethral obstruction

While the peripheral border of the prostate should be traversed, and the degree of the intravesical projection of the various areas noted by the degree and depth of the shadows cast by them, and their relative position with the intraureteral bar and ureteral orifices, the all important feature to be determined by the examination is the shape of the vesical outlet. In this is found the evidence pointing to one or more lobes, which, by compressing the prostatic urethra, impedes the flow of urine through it. Therefore, in determining the site of the obstruction, it is necessary to learn the shape of the vesical orifice, which becomes distorted according to the lobe or lobes enteroaching upon it.

Binanial Examination—With a cystoscopic beak of known size, or the writer's special instrument, in the bladder and the finger in the rectum, the tissue posterior to the vesical orifice, the breadth of the lateral lobes, and the length of the prostatic urethra may be approximately estimated. The intra vesical elevations may be learned by drawing the beak of the cystoscope snugly to the vesical orifice and rotating it. Such elevations are noted by the cystoscope being drawn inward as it ascends, and again outward as it descends the elevation during the rotation of the cystoscope over the prostatic surface (Fig. 7). Such areas are located and their breadth determined by observing the position of the indicating knob and the are through which the beak travels from the time of its rise to its descent. These distinctive features, gained only

by bimanual examination, show the importance of practising this method of examination in connection with cystoscopy for the purpose of gaining information regarding the growth.

Bimanual examination serves chiefly to determine the approximate size of the parts of the gland; but it also confirms and gives more complete knowledge of the sites of the obstructing portions.

The Normal Prostate (Plate I).—The normal vesical orifice when distended is an almost circular, dimple-like depression about one centimetre at its greatest width, without furrows or markings demonstrable by the cystoscope (Plate I, A).

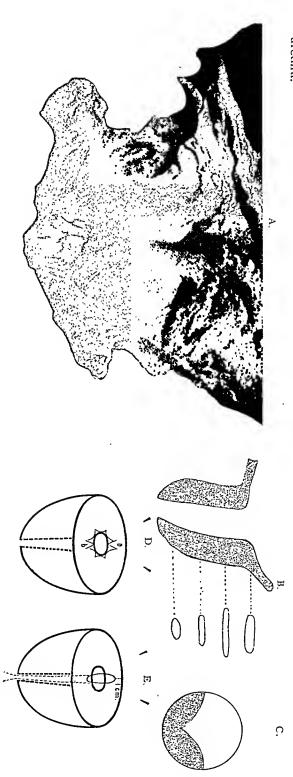
- (1) The Passage of the Cystoscope into the Bladder.— An anterior urethra without constrictions admits of a free passage of the cystoscope to the anterior layer of the triangular ligament, where the instrument is arrested until the ocular end is depressed, which act causes the cystoscope beak to enter the prostatic urethra. As the instrument is gently pushed onward through the prostatic urethra, no increased resistance is felt, nor is the beak deviated to one side or the other.
- (2) Observing the Appearance of the Bladder Outlet.—The light being turned on, the cystoscope is drawn outward until the vesical orifice comes into view. The prism is now on a level with the edge of the vesical outlet, and if drawn outward a little farther, so as to bury it in the urethra, no image will be received. The prism being on the proper level, the beak is made to point posteriorly, and by rotating the instrument the beak is made to traverse the circumference of the bladder orifice, and a series of inverted images in a direction at right angles to the instrument's shaft are seen (Plate I, C). This series of inverted images is recorded (Plate I, D). Plate I, E, represents the actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures of which (C) is an example.
- (3) Bimanual Examination, the Cystoscope in the Bladder, and the Finger in the Rectum.—The electrical connections of the cystoscope being detached, the beak of the instrument is made to point posteriorly, and is drawn snug against the



PLATE II

DOUBLE LATERAL LOBE ENLARGEMENT.

picture of the posterior cleft. D. Diagram of the different cystoscopic fields. E. The actual shape of the vesical orifice and A. Photographed specimen. B. Mesial section of the prostate and cross-section of the urethra. C. The cystoscopic



The urethra is dilated anteroposteriorly. A. Hypertrophy of both lateral lobes of the prostate, with only a slight degree of intravesical projection and lengthening of the prostatic urethra.

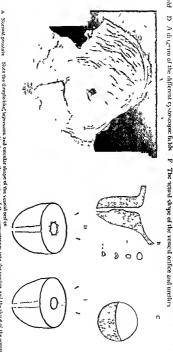
degree of intravesical projection. B. Mesial section of the double lateral lobe enlargement (specimen A), showing the anteroposterior dilatation of the prostatic urethra, with only a slight C. The cystoscopic picture of the cleft formed posteriorly by the enlargement and intravesical projection of the lateral lohes. A similar cleft is seen

D. The diagrammatic record of the different cystoscopic fields of the vesical orifice, showing a cleft posterior, a, and anterior, b, with the remaining fields normal in shape, but slightly deepened by the increased size of the lobes.

E. The actual shape of the vesical orifice determined by transposing the inverted eystoscopie pictures recorded in D, with the accompanying narrowing and lengthening of the prostatic urethra; the tissue posterior to the vesical outlet is diminished in thickness.

PI ATE I

A Photographed specimen B Mestal section of the prostate and cross section of the urethra NORMAL PROSTATE C A normal cystoscopic



treura at different levels Menal section of the Formal prostate (specime 1 A) showing the projection of the veryimportation into the urethra and the shape of the normal

The diagrammatic record of the different cystoscopic fields necessary to cover the circum ference of the vesical or five (A series of cystoscopic The cystoscopic picture of any port on of the normal vesical orifice a single se, ment)

The actual shape of the vesical ornice determined by transposing the inverted cystoscopic pictures recorded in D

vesical surface of the prostate The rectal finger will determine a straight median raphe between the two lateral lobes, and is carried in turn laterally over the smooth, equal sized, nontender lateral lobes which are of normal consistency The finger is now carried to the posterior superior edge of the prostate, where the cystoscope beak of known size is found. and the thickness of the tissue from the posterior edge of the vesical orifice to the posterior edge of the gland is approximately estimated and recorded, as in Plate I. E. With the finger in the median raphe the instrument is withdrawn, and, as the beak passes through the prostatic urethra, the rectal finger follows it, and an approximate estimate is made of the thickness of the tissue posteriorly through the length of the pros tatic urethra No increased resistance, jumps, or deviation of the beak will be noted. If it is desirable to determine the length of the prostatic urethra, the writer's special instrument, pre viously mentioned, should now be used

Double Lateral Lobe Enlargement (Plate II) —When the lateral lobes cause the obstruction, the urethra is narrowed laterally and is lengthened anteroposteriorly. The course of the prostatic urethra is at the same time deviated to one side or the other, if the lateral hypertrophy of one lobe is greater than that of the other, so, instead of a straight urethra dilated anteroposteriorly, its course is also curved. There is an associated degree of intravesical projection of the lobes, and the prostatic urethra is lengthened. Distinct clefts are formed at the anterior and posterior ends of the slit like urethra. The posterior one of which is seen in Plate II, C.

(1) The Passage of the Cystoscope into the Bladder—
There may be difficulty in entering the beak into the prostatic
urethra. As it is pushed on, the beak may be deviated to one
side or the other, according to the greater or less hypertrophy
of one or the other lobes, but when the hypertrophy is equal,
as in the case illustrated, there will be no deviation of the
beak. If, as is sometimes the case, the anteroposterior dilatation of the upper portion of the urethra is so great as to allow
some degree of rotation of the instrument's beak within it,

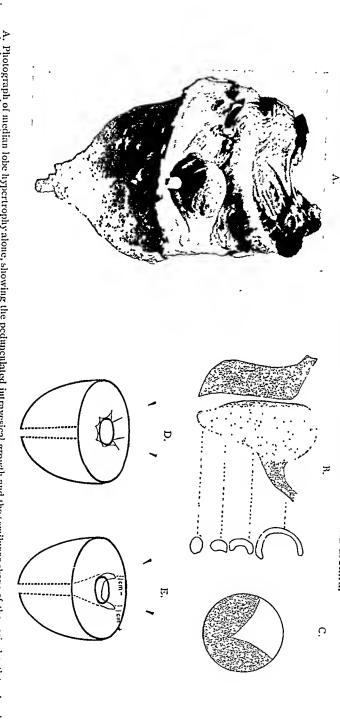
one may receive the false impression that the bladder has been entered. The inability to see anything after the light has been turned on may be the first cue to the true situation. The suspicion of this condition having been aroused, the ocular end of the instrument is depressed and gently pushed onward, causing the beak to traverse the anterior wall of the urethra into the bladder.

- (2) Observing the Appearance of the Bladder Outlet.— The cystoscope being in the bladder, the vesical surface of the prostate is viewed. In the fields a and b of Plate I, D, the cystoscopic pictures as in Plate II, C, will be seen. The cleft at the posterior edge of the urethra will be the deeper. All such clefts enlarge and decrease in size as they are forced open or allowed to close by drawing the cystoscope outward or pushing it inward. This, together with the depth and relative position of the shadow cast upon the lighter colored bladder surface, gives some visual information regarding the degree of intravesical projection of the hypertrophied lobes, but should be corroborated by the more exact method of bimanual examination. The remaining cystoscopic fields are normal.
- (3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.—The cystoscope, or the writer's special instrument, is placed so that the beak points posterior and is drawn snug against the vesical surface. rectal finger will find the median raphe pronounced, the convexity of the lateral lobes increased in size, less sensitive, and harder than normal; the tissue posterior to the vesical surface lessened or little increased over normal. The length of the prostatic urethra will be found increased. Keeping the beak of the instrument snug against the vesical surface of the prostate, it is made to rotate over each lateral lobe in turn. By noting the distance which the instrument is drawn inward as it passes over the intravesical projections of the lobes, and the arc through which the beak rotates in covering the elevated areas, some idea of the size of the intravesical projection is attained (Fig. 7). In withdrawing the instrument, the rectal finger,



MEDIAN LOBE ENLARGEMENT ALONE,

Ģ Diagram of the different cystoscopic fields. Photographed specimen. Mesial section of prostate and urethra. E. The actual shape of the vesical orifice and urethra. . Cystoscopic picture of the left cleft,



A. Photograph of median lobe hypertrophy alone, showing the pedimentated intravesical growth and the semilunar shape of the vesical outlet. A rod is seen in the prostatic urethra, which is unopened. The laterally dilated urethra is seen to either side of the rod's tip.

section of which shows its lateral semilunar-shaped dilatation. prostatic tissue posteriorly and the intravesical growth forming a bas fond. Also the narrowing of the anteroposterior diameter of the arcthra, the cross-Mesial section of the prostate and cross-section of the prostatic mrethra at different levels. The mesial section shows the increased amount of

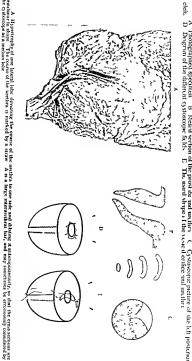
D. A diagrammatic record of the eystoscopic fields of the vesical outlet, showing a cleft a short distance to either side of the posterior median point, C. The cystoscopic picture of the cleft at the right of the pedunculation. A similar eleft is seen to the left side of the enlargement.

which area is occupied by the intravesical hypertrophy.

E. The actual shape of the vesical orifice determined by transposing the inverted cystoscopic pictures recorded in D, showing the lateral semilunar-shaped dilatation of the vesical outlet, due to the pressing forward of the posterior hypertrophy. The amount of prostatic tissue posterior to the clefts of the vesical outlet is lessened.

B Mesril section of the prostite and urethra ONF LATERAL LOBE ENLARGING VI

Photographed specimen



the c) stoscope as a median lobe E. The actual phage of the vesteal orifice determined by transposing the inverted cystoacopic picture recorded in 19 abowing the lateral narrowing lengthening, and deviation of the proxistic unclara. The problems themer observed to the venesionates is a bitle increased. the deviation of the urcturn B Metala section of the single interal loke enlar, ement with the prostate trethra brought into a straight line, showing the anteroposterior diduction. The cross-sections of the urethra show its semilunar single due to the unequal pressure upon the prostate urethra from hypertrophy of only one lateral lobe. The diagrammatic record of the different cystoscopic fields of the vesical orifice showing a cleft posterior and anterior slightly to the left of a The exatoscopic picture of the posterior cleft on the left side showing greater futravesical elevation of the left lobe, which is the one producing A similar cieff is seen anteriorly also on the left of the median line



following the instrument's beak, shows the tissue posterior to the urethra to be little, if any, increased, and usually lessened

One Lateral Lobe Enlargement (Plate III) -When one lateral lobe is hypertrophied, it encroaches upon the urethra, distorting the vesical orifice, so that it assumes the shape of a semilunar slit, a cleft being formed at its anterior and posterior ends The course of the urethra is deviated to one side (Plate III)

- (1) Passage of Cystoscope into the Bladder The cysto scope heak will probably enter the prostatic urethra pointing in a direction opposite to the lateral lobe hypertrophied. During its passage into the bladder, the beak will deviate to the side opposite the hypertrophied lobe. Pressure of the lobe upon the cystoscope, which by its passage into the bladder converts the deviated urethra into a straight line, may be considerable and should be noted
- (2) Observing the Appearance of the Bladder Outlet -The cystoscopic fields of the vesical outlet will show a cleft anteriorly and posteriorly, both on the same side as the hypertrophied lobe, and which clefts mark the ends of the semilunar shaped urethra (Plate III, B, D, E) The remaining fields are normal, except the one between the clefts, over the convexity of the encroaching lobe, which is convex outward
- (2) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum -The cystoscope heak pointing posteriorly and drawn against the vesical surface of the gland will probably slip into the posterior cleft. The rectal finger will find the median raphe ill defined because of the pronounced convexity of the hypertrophied lateral lobe Differ ences in consistency and sensitiveness between the two lobes may or may not be evident Rotation of the cystoscope, or the writer's special instrument, over the lobe will give an approximate estimate of the height and width of the intravesical elevation of the hypertrophied lobe. In withdrawing the instrument, the beak will be deviated in the same direction as during its introduction, that is, away from the hypertrophied

lobe, and the amount of tissue posterior to the urethra is usually increased.

Median Lobe Enlargement (Plate IV).—This form of hypertrophy, which, according to Albarran and Motz (Ann. d. Mal. d. Organ. Genito-Urin., July, 1902), takes place from glandular tissue situated between the lateral lobes in the upper part of the prostatic urethra and called "the prespermatic group of glands," and those glands beneath the mucous membrane which Jones (Virchow's Archiv, 1894, cxxix, 224) has demonstrated as the beginning of such growths, encroach upon the urethra as well as growing upward into the bladder.

The growth into the urethra converts it into a U, the centre of which is occupied by the hypertrophied tissue, and on either side of which the urine is passed. These slits are seen by the cystoscope as clefts of varying size and depth according to the degree of the growth, and are located one on either side of the posterior median line (Plate IV, C, D, E).

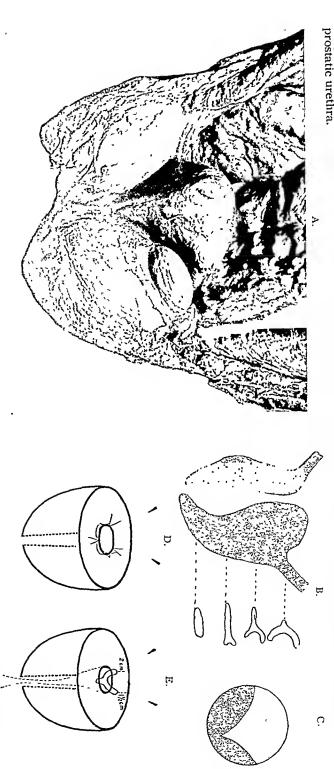
- (1) Passage of the Instrument into Bladder.—The instrument in its passage through the prostatic urethra will remain in the median line until it reaches its upper part, where the beak, meeting the median obstruction, will rotate to one or the other sides of it, and thus enter the bladder through one of the clefts. The side to which the beak rotates is usually the larger cleft. By withdrawing the instrument to the point where the beak rotates back to the median line, it may be made to enter the bladder through the other cleft by rotating it slightly to the opposite side, as it is gently pushed inward towards the bladder. This is true only when the clefts are of nearly equal size. This will be clear by comparing Plates IV and VII.
- (2) Observing the Appearance of the Bladder Outlet.— The cystoscope views will show a cleft on either side of a median posterior point, which clefts are situated at the ends of the U-shaped urethra (Plate IV, A, B, C, D, E). When the middle lobe is small, it is sometimes seen as a distinct tumor springing from the posterior edge of the prostatic urethra. The larger forms, owing to the limited fields of vision of the



PLATE VI

ENLARGEMENT OF BOTH LATERAL LOBE AND THE MEDIAN LOBE.

scopic picture of the left cleft. D. Diagram of the different cystoscopic fields. A. Photographed specimen. B. Mesial section of the prostate and cross-section of the prostatic urethra. E. The actual shape of the vesical orifice and The cysto-



which extends into the methra. The large, smooth surface on the lateral lobes is the opened weethin, and shows the large degree of anteroposterior dilatation A. Photograph of a prostate with hypertrophy of both lateral and the median lobes. Note that the projection of the median lobe makes the urethra Y-shaped, a cleft running to either side of the growth The mestal section shows the narrowing of the upper half of the wrethra The clefts of the methra are seen at either side of the median lobe

anteroposteriorly, due to encroachment of the median lobe Mesial section of the prostate with closs-sections of the prostatic methra. The lower half is dilated anteropostenorly from the pressure of the enlarged lateral lobes.

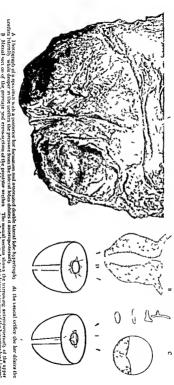
extremity of the urethra. cross-sections show the shape of the urethra at the different levels. C. The cystoscopic picture of the light urethral cleft. A diagrammatic record of the different cystoscopic fields of the vesical ortfice, showing a cleft at either side of the posterior median line, which area A simular eleft ts seen to the left of the median enlargement, and another in the middle anterior

is occupied by the median lobe, and also at the median anterior extremity of the vesical orifice, which is produced by the compressing lateral lobes half of the urethra is dilated laterally and semilunar in shape, the lower half is dilated anteroposteriorly from the pressure of the bilaterally enlarged lateral The actual shape of the resical outlet and prostatic urethra determined by transposing the inverted extoscopic pictures recorded in D. The upper

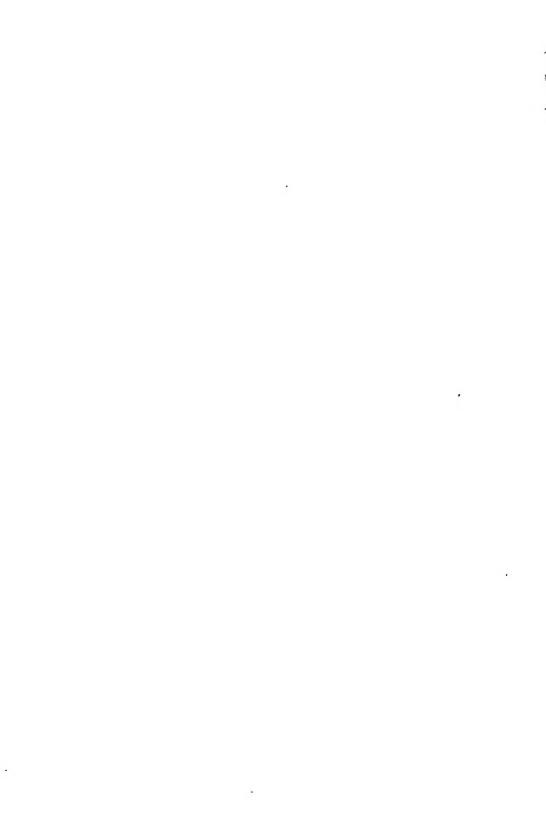
The prostatic urethia is lengthened.

ENCROACHMENT CLON THE PROSTATIC UNLTHRA BY A POSTERIOR MAR

U Diagram of the different evstoscopic fields I histograph, specimen If Mestal section of the prostate and urethra The neural shape of the vesical orifice and prostatic irrethra Cystoscopic picture of the right cleft



laterilly dilatated urethra dso one anteriorly the product bretten due to the bar curroachment and it, delaying noteroposterorly below it due to the lateral pressure of the hypertrophical identity The cross section at owe one ships of the mental at the different levels The eyeloscopic lacture of the small eleft at the function of the locaterior bar and right interd lobe. A similar cleft is seen to the left enh of the distance ure har. There is also a clust rather deep to the interior median line, that to a slight degree of literal lobe pressure upon the residuance of the content of th The actual slaps of the vesical profee determined ty trans A diagrammatic record of the different costopes in felds of the vessest orange showing a cleft at either end of the laterally dilatated within and The product of issue joy/erfor to the vesical outlet is much increased tiue to st git t ressure of the literal lobes anterior to the posterior bat the inverted cystoscopic actures in D showing the lateral dilatation of the urethra e anterior purtion of the vesical outles from pressure of the hypertrophied The prostatic acethra is tengthened



evstoscope, can only be judged by the position of the clefts. the composite pictures necessary to cover the growth, and the degree and location of the shadow east by it upon the lighter colored bladder wall

(3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum -In attempting to make the cystoscope beak point posteriorly and maintain a position upon the vesical surface of the gland, the beak will slide into one of the clefts at either side of the median enlargement. Unless the ocular end of the instrument is raised, the beak, if short, will be drawn into the urethra. The amount of tissue between the posterior edge of the cleft and the posterior border of the prostate should be carefully estimated, especially if a Bottini operation is to be performed, because, as seen, an in strument will by choice enter one of the clefts

The rectal finger will often be unable to detect any median raphe because of its obliteration by the hypertrophied tissue immediately in front of it. The intravesical projection and width of the median lobe are determined by rotating the cystoscope, or the writer's special instrument, from one cleft over the growth and into the other as seen in Fig. 7, thereby gain ing approximate estimations of the height and breadth of the intravesical projection. In withdrawing the instrument, the beak, which is turned to one side during its passage through the cleft, will rotate to the median line at the point in the prostatic urethra at which the median lobe ceases to encroach

Posterior Bar Formation (Plate V) -In this condition the same tissue is hypertrophied as in the third, median, or middle lobe enlargement, the only difference being that the growth does not extend intravesically to such a degree. The vesical outlet is distorted into a transverse slit, but usually, as in the case illustrated, the lateral lobes are also enlarged, and dilate the urethra anteroposteriorly to a greater or less degree, which distortion becomes more evident below the bar encroachment, which is confined to the upper fifth of the prostatic Thus, upon entering the prostatic urethra with the instrument, there is considerable room anteroposteriorly until the bar is reached, when the beak may be rotated almost 45 degrees, and enters the bladder with the beak almost transverse to the long axis of the body, or, being forced forward by the bar, will depress the ocular end of the instrument.

As in the case illustrated (Plate V, B, D, E), three clefts are evident, one at either end of the laterally dilated urethra, formed by pressure of the posterior bar, and one in the anterior median line from pressure of the lateral lobes.

- (1) Passage of the Instrument into the Bladder.—The cystoscope beak will traverse the anteroposteriorly dilated urethra without deviation to one or the other sides until it reaches the posterior bar, where the short Mercier beak, striking the projecting bar, will be forced forward, and, if the vesical orifice is not too firmly pressed upon by the bar, will enter in the median line. If, however, the bar is large and the urethra much dilated laterally, the beak may rotate to an angle of 45 degrees to one side or the other, and enter the bladder through one of the lateral clefts. It is for this type of hypertrophy that the Mercier beak is especially adapted.
- (2) Observing the Appearance of the Bladder Outlet.— The cystoscopic pictures received by rotating the cystoscope around the vesical orifice show three clefts, two laterally and one in the anterior median line (Plate V, B, D, E). Care should be taken not to mistake a large interurethral bar for hypertrophied prostatic tissue, as previously mentioned (Plate III). In a small contracted bladder, in which the interureteral bar is prominent, it is often difficult to differentiate the two, and the only safe guide will be the location of the urethral clefts.
- (3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.—The cystoscope beak, pointed posteriorly and drawn against the vesical surface of the prostate and the rectal finger looped over th , edge of of tissue the glands, will give evidence of the incr 1 osterior between the posterior edge of the uret border of the gland. The 2" alone. lateral may be absent; but as in the in the lobes are also enlarged, ti lower half of the gland.

Rotation of the instrument over the surface of the prostate shows but little elevation over the posterior and posteriorlateral segments. In withdrawing the instrument, the beak, although in the pronounced cases entering the bladder through one of the lateral clefts, may usually be withdrawn from the median line. It will be felt to slip backward as soon as the bar is passed, and, as in the introduction of the instrument the beak will not deviate from the median line during the remainder of its withdrawal.

Enlargement of the Lateral Lobes and the Median Lobe (Plate VI) —When both lateral lobes and the median lobe are enlarged, the vesical orifice is Y shaped. The hollow of the Y is produced by the growth of the median lobe forward, and the stem of the Y by the compression of the urethra from both sides. The stem is long or short according to the greater or less degree of forward projection of the median lobe or hypertrophy of the lateral lobes. Clefts are formed one on either side of the median lobe and one at the interior end of the urethra. The prostatic urethra is lengthened and at its upperend divided into two channels one on either side of the median lobe and which channels terminate as the lateral clefts of the vesical orifice. By studying the figures of Plate VI it will be evident that not only the vesical orifice is Y shaped, but also the prostatic urethra uself.

- (1) Passage of the C3stoscope into the Bladder—The c3stoscope beak will deviate to one side or the other during its pissage through the upper part of the prostatic urethra, that is, when it arrives at the point of division of the urethra into the channels at the side of the median lobe. One channel is usually larger than the other, and is therefore, the more natural course for the instrument to take. The presence of a channel on the other side of the median lobe may be demonstrated by withdrawing the instrument just below the point at which the deviation takes place and, by turning the beak in the opposite direction, make it traverse the channel at the other side of the median lobe into the bladder.
 - (2) Observing the Appearance of the Bladder Outlet -

The cystoscope will reveal three clefts, one on either side of the median lobe, usually large, and a somewhat smaller one at the anterior median point (Plate VI, A, C, D, E). Some idea of the intravesical projection of the median lobe may be obtained by observing the degree and location of the shadow cast by it upon the lighter colored bladder wall. The size of the median lobe cannot be judged by the number of fields necessary to cover it, because, if it projects into the urethra, as does the illustrated figure, most of the views will be taken with the cystoscope in one of the other clefts, and the lobe may at the same time be pushed to one side by the cystoscope's shaft.

(3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.-With the beak of the instrument pointing posteriorly and drawn onto the vesical surface, it will be situated in one of the clefts at either side of the median lobe. The amount of tissue posterior to the urethra from the posterior edge of these clefts is slightly increased. The rectal finger will, as a rule, fail to detect any median raphe because of the hypertrophy of the tissue posterior to the urethra. The enlarged lateral lobes are hard and not sensitive. The length of the prostatic urethra will be found increased. By rotating the cystoscope, or the writer's special instrument, over the vesical surface of the prostate, the degree of elevation and the breadth of the median lobe and of each lateral lobe may be approximately estimated. In withdrawing the instrument, the beak will deviate to one side of the median enlargement, and will remain so until it passes the lowest point of the median encroachment, where it will be held in the median line if the two lateral lobes are equally hypertrophied.

Enlargement and Fusion of the Left Lateral Lobe and the Median Lobe (Plate VII).—As seen in the illustrated case, the left lateral lobe and the median lobe are moderately hypertrophied and fused with one another. The right lateral lobe is also slightly enlarged. The urethral channel passes to the right of the median lobe, where it terminates in a cleft.

A similar somewhat smaller cleft in the anterior median



IRREGULAR HYPERTROPHY OF THE MEDIAN LOBE.

and prostatic urethra. scopic picture of the two left clefts. A. Photographed specimen.

D. Diagrammatic record of the urethral clefts. B. Mesial section of the prostate and cross-sections of the prostatic urethra. E. The actual shape of the vesical outlet



the urethra is split into three distinct clefts. B. Mesial section of the prostate and cross-section of the prostatic urethra. Photographed specimen of a prostate with irregular hypertrophy of the middle lobe. There are three small tumors separated by deep urethral. The bases of the tumors are on the vesical surface of the gland and the apices of the urethra, each tumor forming an irregular cone, between which

photograph. C. The cystoscopic picture of the two left urethral elefts formed by the cone-shaped hypertrophies. The cross-sections give a diagrammatic idea of the irregular shape of the irrethra at the different levels. The mesial section fails to show the cone-shaped hypertrophics seen in the

D. A diagrammatic record of the different cystoscopic fields of the vesical orifice, showing the three urcthral clefts posterially, a, b, c.

E. The actual shape of the vesical orifice and the prostatic urethra determined by transposing the inverted cystoscopic pictures of D.

the vesical outlet and pressing untille scopic picture of the urethril cleft to the left of the methan lobe Photographed specimen I NEARCH MENT AND RESIDENCE THE LITT LATERAL FOR AND THE SHOREN FOR Mescal section of the prostate and cross sections of the prostate mether MAII VII D Dagrum of the arethral clebs The actual steps of C. The cysto-

A Photograph of a prostate with hypertrophy of the left lateral hobe and the medicin lobe. The enlarged Interal and median I because so fused to either one cannot be distinguished from the other. The right lateral hole however as evident, the deflection of the orethra to the right and the skymoid shape. arethra is illiated anteroposteriorly from the fressure of osterior to it e arches from the enlarged posterior lite and also the encrotehment of this medern like upon the of the vesical outlet is distinct A diagrammatic record of the different cystoscor Mesal section o ne extoscopie I icture of provide an I cross-sections of the prostatic arctira at different levels the right urabrai cien 1 captersor c A smiller chilt is also seen at the anterior median bor ler of the vesical outlet and the form of the action and the contract of be cross-sections show the shape of the thit A civil is seen to the right of the posterior median line formed by The mestal section shows the large amount of assue ated urethra Ikluw the

ne prostatic utethra is len of the ses cal orance an proughe inverted substantial postern ris in mither resource of the

:	

line will give evidence of the sigmoid shaped vesical outlet (Plate VII, A, B, D, E)

- (1) Passage of the Cystoscope into the Bladder—As the instrument meets the lowest point of projection of the median lobe into the urethra, it will be deflected to the right and will enter the bladder through the cleft at the right of the median lobe.
- (2) Observing the Appearance of the Bladder Outlet The various cystoscopic views will determine the presence of a cleft at the right side of the median lobe and another in the anterior median line (Plate VII, A, C, D, E) Some degree of intravesical projection of the median lobe is evident by the small shadow east upon the bladder wall
- (3) Binanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum —When the beak of the cystoscope, or the writer's special instrument, is made to as sume a posterior position on the vesical surface of the gland it will be situated in the cleft at the right of the median lobe. The tissue posteriorly is increased in thickness. The median raphe is obliterated in the upper half of the gland but is evident below this point. The length of the prostatic urethra is increased. In rotating the instrument over the vesical surface some idea of the intravesical projection and width of the me dian lobe is determined. In withdrawing the instrument the beak will be found to rotate to the right until it passes the lowest point of projection of the median lobe where it will rotate to the median line and remain so throughout the remain der of the prostatic urethra.

Irregular Hypertrophy of the Median Lobe (Plate VIII)

—This condition, seen in Plate VIII, A is very unusual. The area usually the site of median lobe enlargement presents three small tumors, which project into the upper part of the prostatic urethra, and which are separated from one another by distinct urethral clefts.

(1) Passage of the Instrument into the Bladder—The cystoscope in its passage through the prostatic urethra will enter one of the three clefts, and thus pass into the bladder

The beak of the instrument will be deviated in a direction dependent upon the cleft through which it passes.

- (2) Observing the Appearance of the Bladder Outlet.— Each urethral cleft appears distinct with the cystoscope, and by recording their location the shape of the vesical orifice becomes evident (Plate VIII, D, E).
- (3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum.—When the beak is made to point posteriorly and to assume a position on the vesical surface of the gland, it will be in one of the clefts. The tissue posterior to the urethra at this point in this special case is increased. The rectal finger distinguishes no median raphe, and no evidence of the irregular hypertrophies is demonstrable on the posterior surface of the gland. In the case illustrated, there is no lengthening of the prostatic urethra. In rotating the instrument over the vesical surface of the gland, it is necessary to depress its distal end to make it pass from one cleft to the other, and, as it does so, the largest tumor is felt to slip by the shaft of the instrument. In withdrawing the instrument, the beak will deviate in the direction of the cleft through which it is withdrawn.

Nodular Hypertrophies Projecting into the Urethra (Plate IX).—Prostatic obstruction due to this form of hypertrophy, although rare, should not be overlooked, and proper skill in the examination should detect the character and site of such prostatic obstruction. As seen in Plate IX, A, the gland is not much enlarged, nor is the vesical outlet distorted as in the usual manner of the more common forms of prostatic hypertrophy. It will be seen that the course of the urethra is tortuous and irregular in its distortion. This is due to nodules, submucous and intramural, projecting into the prostatic urethra. The presence, however, of a nodule at the site of the median-lobe hypertrophy forms a distinct urethral cleft posteriorly and to the left of the median line, and this, together with the other nodulous growths, has changed somewhat the shape of the vesical orifice (Plate IX, B, D, E).

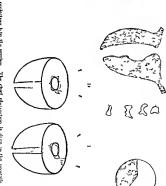
(1) Passage of the Cystoscope into the Bladder.—This

PLATIT IN

NODULAR HYLERTROPHIES I ROJECTING INTO THE URI THEA

ordice and prostatic uretim picture of left urethril cleft t notographien specimen U Diagrammatic record of the various cystoscopic fields Mean's section of the prostate and cross section of the prostatic tirethra The actual shape of the vesical





where there is a large intransural notine p ish ag the urethra to the left and a smaller one above it on the left facing the urethra to the right making it intramural no fules p ishing into the urathra and thisting it is great fort anteroposteriorly gross sections show also that the same aregular diduction I as taken place interally. The existence in p et are of the left of Mesial section of the prostate and cross sections of the prostatic unethra at different levels Photographed specures of no bular hypertrophied areas projecting hato the arethra The actual slape of the vesical enrice and craggan matte record of the various eystoreog le ful ly of by transposing the evidouopic record of D orline showing a cleft in the left posters is squient or the cardoscopic record of D the torthous until had be due to the wether by the right letramural growth The chief obstruction is deep in the prostable arethra The arethra is seen irregularly dilated anteroposteriorly

F

step in the examination is the most important in determining this form of prostatic obstruction. As the instrument's beak meets one of the nodular growths, it is deviated to one side, where it remains until it passes over the nodule, when it will again rotate to its former position or assume a new direction from the pressure of another nodule. There is increased resistance to the passage of the instrument during its passage over the nodules, and there may be distinct jumps not unlike that felt in urethral stricture when examining with a bougle a boule

In the case illustrated, the instrument enters the bladder with the beak rotated at an angle of about 45 degrees to the left, in other words, it enters through the cleft at the left of the median nodule (Plate IX, A)

(2) Observing the Appearance of the Bladder Outlet — But a single cleft appears in the cystoscopic fields of vision This and the remaining fields and the actual shape of the vesi cal orifice are seen in Plate IX (C. D. E)

(3) Bimanual Examination with the Cystoscope in the Bladder and the Finger in the Rectum — The cystoscopic beak, when made to point posteriorly and he against the vesical surface of the prostate, falls into the cleft at the left of the median nodule. The tissue posterior to the instrument is diminished in amount, while to the right of the cleft it is increased. No median raphe is demonstrable by the rectal finger, and the posterior surface of the gland is nodular. These nodules are hard. By rotating the instrument, no additional information regarding the character of the obstruction is gained. In with drawing the instrument, the beak will deviate as during its introduction.

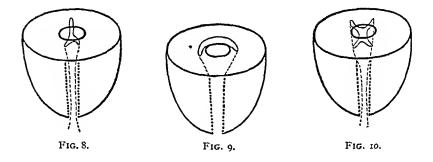
NOTE—The case from which this specimen was taken was operated upon for vesical calculus and the stone removed through a suprapulse incision. The character of the prostatic obstruction was not known at that time. The size of the vesical orifice and the gland itself at this time did not seem to warrant its removal, and the patient's symptoms of obstruction to the outflow

of the urine were considered referable to the vesical calculus present. The symptoms, however, of obstruction persisted for a year following the operation, at which time the patient died.

There are other rare forms of distortion of the vesical outlet which may exist and form clefts of diagnostic significance.

Fig. 8 is an orifice distortion due to enlarged lateral lobes with slight hypertrophy of the prostatic tissue anterior to the urethra. Three clefts are formed, two anteriorly, one on either side of an anterior median joint, and one at the posterior median point.

Fig. 9 is an example of hyperplasia of the tissue of the same area, resembling the condition seen in the posterior lobe



hypertrophies. There is a cleft formed at either end of the semilunar-shaped urethra.

Fig. 10 shows hypothetical hypertrophy of both lateral lobes, the posterior lobes, and the tissues anterior to the urethra, all producing distortion of the vesical orifice, and showing the existing clefts which are characteristic of their respective encroachments.

The various forms of hypertrophied prostatic tissue showing obstruction in the prostatic urethra, as evidenced by their characteristic distortions of the vesical orifice, have been noted, together with the discrete nodules projecting into the urethra.

It must be emphasized that the clefts seen by the indirect cystoscopes are inverted, that is, turned upon themselves, so that to get a correct picture of the shape of the urethral ornice the clefts found must be transposed as illustrated in the plates

1 The Condition of the Remaining Portion of the Blad der and the Urcteral Ornices—The bladder will in most cases be either contracted or dilated, markedly trabeculated or, if atonic, smooth with only slight trabeculation, with associated evidence of chronic cystitis. A bas fond of varying size will usually be present, and urmary incrustations and stones, so commonly associated with enlarged prostate, should not escape notice.

It is important to note the size of the interureteral bar and ureteral orifices which will give valuable information regarding the degree of the intravesical pressure

Besides noting the size of the possibly dilated ureteral mouths, it is of importance to establish some idea of each kid ney's secretory power by the rate of the ureteral ejaculation, when the conditions render this observation possible

- 2 The Comparative Size of the Various Lobes —Various cystoscopic views of the different lobes do not give a trust worthy idea of their respective sizes because of the absence of a sufficient degree of perspective. Some idea of the size of the intravesical growth may, however, be gained by carefully observing the density of the shadow cast by the edge of the prostate onto the surrounding bladder surface, and the relative position of the shadows with the interureteral bar and ureteral orifices. In order to gain approximate estimates of the comparative dimensions, both intravesically and laterally, one must resort to humanual examination, as already described.
- 3 The Length of the Prostate Urethra—All forms of prostate hypertrophy lengthen the prostate urethra, especially the posterior enlargements. The determination of the degree of elongation is a very important point if a Bottim operation is to be performed. It is, perhaps, equally as important in influencing any given individual in choosing either the permeal or suprapuble routes for radical operation upon the gland. It may be learned by practising binningle examination with the

cystoscope or upon the writer's specially devised instrument for this purpose. In using either device, the beak is brought snugly against the vesical surface, so that the tip points posteriorly. The finger in the rectum locates the tip of the instrument, and is then drawn outward over the posterior surface of the gland until the shaft of the instrument is felt as it protrudes from the apex of the prostate. By locating these two points on the instrument, the distance from the vesical surface of the gland to its apex is approximately determined.

This important distance is learned more accurately by the writer's previously mentioned instrument, which, having four grooves on the surface of the shaft, each one centimetre apart, beginning three centimetres from the beak, may be counted off by the finger in the rectum, and the beak being snug on the vesical surface, the length of the prostatic urethra is accurately determined in centimetres (Fig. 7).

METHODS OF RECORDING CYSTOSCOPIC EXAMINATIONS.

It is necessary to record with some degree of mathematical accuracy the various measurements of the abnormalities on the prostatic surface, the shape and size of the vesical orifice, and the length and shape of the prostatic urethra.

Cystoscopic photography may be of service in only a very few cases where small pedunculations are evident in a single cystoscopic field. To record the various cystoscopic fields even by the new Hirshmann or the Casper photographic cystoscope is far from practical, not only on account of the technical difficulties associated with the practice, but because of the unfavorable intravesical condition usually present in this class of cases.

Wax modelling, after the method advocated by Fenwick ("Electrical Illumination of the Bladder and Urethra," 1889, p. 85), may be used to indicate the intravesical condition of the prostatic surface and such distortions of the vesical outlet as may be evident. By this method, however, no information regarding the interurethral conditions can be recorded.

Moreover, the model cannot be constructed during the examination

Diagrams—At the meeting of the American Genito Urinary Surgeons in 1903, Dr. Hugh Young, of Baltimore demonstrated a new method of recording the appearance of the vesical orifices which is more satisfactory. The diagram upon which the record is made consists of a series of eight rings corresponding to the same number of cystoscopic fields, arranged side by side in the form of a circle. By rotating the cystoscope around the circumference of the bladder outlet and recording each picture in its diagrammatic field, an exact impression is made of the existing condition of the vesical orifice. The pictures thus recorded are, of course, inverted, and an accurate idea of the shape of the vesical orifice is not obtained until the outlines recorded in the respective fields are turned upon themselves and the shape of the vesical orifice reconstructed in the mind of the operator.

Young's method, like Fenwick's, only enables one to systematically record the condition of the vesical surface of the prostate, and the former's method, being much more technical, is not intelligible to one unfamiliar with this practice

It has been the writer's custom to record the condition of the vesical orifice by Young's method at the time of the examination, and, jotting down the dimensions of the various lobes and length of the prostatic urethra, to model the gland in waxed clay and file it with each case. This procedure requires considerable time and necessitates much clay

With the idea of being able to diagrammatically record abnormal conditions existing in any part of the prostate gland, the writer has made accurate measurements of fifty normal prostates, from which a composite has been made as seen in last two diagrams of each illustrative plate

The measurements taken for this purpose were the length from the vesical orifice to the tip of the prostate, the width of the vesical surface, the anteroposterior diameter of the vesical surface, and the vesical outlet, in its anterior and posterior diameter. The distance from a centre point in the vesical orifice, and the lowest point of each ureteral orifice, and the width of the trigone from these points were also carefully estimated.

The diameters have been measured and recorded by von Frisch (Nothnagel Specielle Path. u. Therap., 1889, xix, ii, iii, 4) and by Thompson ("The Diseases of the Prostate," 1883, p. 5), which figures correspond with those of the writer, as seen on page 614.

The length of the prostatic urethra as given by von Frisch is 33 to 45 millimetres (Thompson, 25 to 30 millimetres), [author's composite of fifty cases, 40 millimetres]. Width of the vesical surface, von Frisch, 34 to 51 millimetres (Thompson, 32 to 40 millimetres), [author, 47 millimetres, of this the vesical orifice in its greatest diameter averages 11 millimetres]. Thickness, von Frisch, 13 to 24 millimetres (Thompson, 20 to 25 millimetres), [author's composite, 24 millimetres, of which 13 millimetres was posterior and 11 anterior]. (The composite also shows the left ureteral orifice to be a greater distance from the central point of the vesical orifice than on the right. The left averages 24 millimetres, the right 22 millimetres. The ureteral orifices are apart from one another, 21 millimetres.)

From these measurements the average composite was formed, and made in the form of a stamp. Taking the normal diagrammatic outline, any abnormal conditions may be recorded with pencil at the time of the examination, illustrative examples of which are seen in the last two diagrams of each plate.

In conclusion, I wish to express my thanks to Dr. Abner Post, Dr. Francis S. Watson, and Dr. Paul Thorndike for the privilege of cystoscoping cases while serving as House Surgeon to their wards at the Boston City Hospital.

The writer is also indebted to Dr. Hugh Young for showing him, late in the year 1902, his method of recording cystoscopic views of the prostate. This systematic method has been of much service in making diagrammatic studies of the early cases.

THE CYSTOSCOPE IN PROSTATIC HYPERTROPHY 619

The specimens of Plates II, III, IV, V, VI, and VIII are the property of Dr Francis S Watson, and have been published in his admirable monograph of 1888, already referred to I wish to express my appreciation of his courtesy in allowing me to make use of them in this study

Note—Since writing this paper, Dr Young has published a more complete account of his method of recording cystoscopic examinations of the prostate (Johns Hopkins Hospital Bulletin, November, 1904, p. 448)

TRANSPERITONEAL LIGATURE FOR ANEURISM OF EXTERNAL ILIAC ARTERY.

BY O. J. CURRIE, M.B., M.R.C.S.,

OF PIETERMARITZBURG, NATAL,

Surgeon to Grey's Hospital and Natal Government Railway Hospital.

THE following case presents two points of interest, which makes it worth recording, firstly, the patient suffered from two aneurisms within the space of three years, which were both cured by ligature; and, secondly, the ease with which the external iliac artery was secured by transperitoneal incision.

H. D., European, aged thirty-six years, was admitted into Grey's Hospital under my care on January 19, 1904, with a sacculated iliac aneurism on the left side.

He stated that he had suffered from syphilis about twenty years previously.

About three years ago he developed an aneurism of the right popliteal artery, for which his femoral artery was tied by Dr. Ward, the result being the complete cure of the aneurism.

About six weeks before admission, whilst lifting a heavy weight, he felt a pain in the right groin. A week later he noticed a pulsating swelling in the groin which was painful, and which rapidly increased in size until his admission into hospital.

On admission there was a large swelling in the left groin about five inches long and about four inches in transverse diameter, extending into the iliac fossa beneath Poupart's ligament, with a tendency to spread towards the anterior superior spine. The pulsation was strongly expansile, and there was a loud systolic bruit heard on auscultation. There was no tenderness on palpation.

The treatment adopted during the first few days was complete rest combined with the administration of large doses of iodide of potassium, and morphia when necessary to relieve pain. The limb was shaved and cleansed and wrapped in antiseptic wadding.

On the 24th and 25th the aneurism increased so rapidly in size that it was decided to operate at once. The increase in the size extended upward into the iliac fossa and involved more of the external iliac artery. The whole limb having again been cleansed and enveloped in antiseptic dressing, the skin of the abdomen was prepared for operation in the usual way. On account of the rapid increase in size, and as the encroachment of the swelling along the external iliac artery rendered it uncer tain whether it would be necessary to tie the external or common iliac, the transperitoneal operation through a median incision was decided on Chloroform was administered, the patient placed in the Trendelenburg position, and a five inch incision made in the median line of the abdomen. The intestines were pushed up and the abdominal walls well retracted, the peritoneum was then divided over the external iliac artery for about two inches in a line internal to the sigmoid flexure. The artery was well exposed, and a double silk ligature applied and tied in a stay knot as recom mended by Ballance and Edwards The vein was not seen at all during the operation Pulsation ceased in the aneurism imme diately

A little difficulty was experienced in picking up the perito neum owing to the depth of the wound, the patient being some what stout, but this would have been obviated had a longer pair of forceps been at hand, and on the whole the operation was a fairly easy one

The peritoneum over the artery having been closed with two or three stitcles, the hiddomen was sutured in layers. The patient was put to bed and the usual treatment adopted. Twenty four hours afterwards there was a slight rise of temperature. On the 29th the bowels acted after a dose of salts, and the patient made a satisfactory recovery. The circulation was well maintained in the limb the aneurism showed no signs of pulsation on the fourth day after the operation became firm, and in a few days presented a hard clearly defined outline. Eight days after the operation pulsation could be felt in the posterior tibal artery, and at the end of eight weeks the patient was discharged from liospital circed.

Comparatively few cases of transperitoneal ligature of the iliac arteries have been recorded

Mr. Clement Lucas related a successful case in the *Lancet* some years ago, but I am unable to find the record.

In Jacobson's "Surgery" (Vol. ii, page 23 et seq.) the following cases are mentioned:

Three operated on by Dr. Dennis, of New York.

- (1) Ligature of both internal iliacs for pulsating tumors in both gluteal regions. (Median incision.)
- (2) Ligature of right internal iliac for gluteal aneurism. (Curved lateral incision.)
- (3) Ligature of left internal iliac for aneurismal varix. (Median incision.)
- (4) Mr. Yakin's case (*Lancet*, 1892, page 1328). Inguinal aneurism. Ligature of external iliac. (Incision in left linea semilunaris.)
- (5) Same patient developed an aneurism on right side, for which right external iliac was tied. (Incision in right linea semilunaris.)
- (6) Mr. Mitchell Bank's case. Iliofemoral aneurism; ligature of right external iliac. (Incision in right linea semilunaris.)
- (7) Mr. W. H. Brown's case. Ligature of right external iliac for iliofemoral aneurism and femoral aneurism. (Median incision.)
- (8) Mr. Wherry (Lancet, Vol. ii, 1893, page 136). Ligature of internal iliac for pulsating sarcoma of innominate bone. (Median incision.)

Sir Frederick Treves, in his "Manual of Operative Surgery," Vol. i, page 213, records a case of ligature of internal iliac for vascular tumor of buttock. (Median incision.)

Howard Kelly mentions two cases of ligature of internal iliac by median incision; one for hæmorrhage, the other to check a rapidly growing cancer.

Various methods have been adopted in the treatment of iliac aneurism. Syme's operation is still recommended by some surgeons. Compression has been resorted to, but is not to be recommended, on account of the risk of bruising and injuring the contents of the abdomen.

A successful case of treatment by compression is nar rated in the Annals of Surgery, October, 1903, page 498. by Shepherd, of Montreal Compression was the treatment adopted, as the patient objected to operation

Proximal ligature of the artery is the operation usually performed for iliac angurism, and previous to the days of safe abdominal surgery the operation was always performed extra peritoneally. But now that the risk of an abdominal section per se has diminished to almost nothing, the easiest and most

direct method of operating should be adopted By operating transperitoneally, the best position to tie the

artery can be selected, and a ligature applied on a portion of the vessel sufficiently remote from the disease, and, if found necessary, the common iliac may be tied where the ancurism extends too high up on the external iliac to allow of the ligature being applied to that vessel

I would recommend a median incision in most cases, as with the Trendelenburg position the intestines fall away from the pelvis, and with suitable retractors the external, internal, or common iliac vessels may be reached. A long pair of forceps should be at hand for the purpose of picking up the peritoneum over the iliac artery, and after incising this mem brane a blunt dissector should be employed to push aside the venous plexus and other structures covering the artery, which should be well exposed and tied with silk in a stay knot

AN OSTEOMA OF THE FRONTAL SINUS.

BY HILL HASTINGS, M.D., OF LOS ANGELES, CALIFORNIA.

THE osteoma shown in the photograph was found on making sections of a skull for purposes of study, and is reported to add to the record of such growths, as well as for its slight bearing on transillumination of the frontal sinus.

In reporting a similar case, A. S. Tauber (*Centralblatt für Chirurgie*, July 23, 1898) reviewed the literature, and found that twenty cases of frontal sinus osteomata had been removed by operation, with nine deaths. It has been impossible to find any similar specimen reported in American literature, possibly due to its infrequency, and also to the fact that frontal sinus investigations have been of comparatively recent date.

No history of this case could be obtained; nor would it likely give any symptoms referable to the osteoma.

The specimen was prepared by E. Burchell, formerly one of the assistants in the Pathological Department of the New York Eye and Ear Infirmary, to whom credit is due for many excellent bone specimens.

The view of the osteoma in plate is from above, looking downward and inward, and shows the root of the growth.

The osteoma in this specimen springs from the floor of the left frontal sinus by a short stalk-like neck, about threequarters of a centimetre in diameter; it is directed upward and inward, enlarges to the size of a small hickory-nut, and almost completely fills the inner half of the sinus. Its measurements are as follows,—two centimetres transversely, two centimetres vertically, one centimetre thick.

Its surface is hard, shiny, and slightly uneven. Its posterior surface is flattened and in contact with the sinus wall. The opening of the nasofrontal duct in the floor of the sinus is not encroached upon by the osteoma, the root of which is about one centimetre to its outer side.

The right frontal sinus is quite large and does not contain any bony growth. The other accessory sinuses are likewise normal.



Osteoma of the frontal s us

		1	
	•		
			£90
			\$

TRANSACTIONS

CHICAGO SURGICAL SOCIETY.

Stated Meeting, December 5, 1004

The President, DR L L McARTHUR, in the Chair

RESECTION OF THE JAW

DR ALBERT E HALSTEAD exhibited two patients The first was a male, aged fifty five years, who about nine months ago noticed a small lump just at the angle of the right lower maxilla. which continued to increase rapidly in size, and was removed by a surgeon about a month after its appearance. It recurred shortly after the operation and the patient was subjected to treat ment by the X ray fourteen or fifteen times without any improve The patient was admitted to the Cook County Hospital on the 15th of August, last year, and Dr Halstead operated on the 1st of September, making a unilateral resection of the lower law, removing half of the jaw, and patient made a very quick recovery without any unfavorable symptoms The tumor began in the submaxillary gland, was of very rapid growth, and extremely malignant. At the second operation the incision was made high up on the cheek and about three inches below the jaw, a large defect was left which was covered by a skin flap taken from the anterior wall of the chest, this healed by primary union There was no fistula, no great amount of deformity, and the patient can use the jaw freely

The second case was a man sixty years of age, upon whom he operated September 17, removing the right half of the inferior maxilla. This patient came from the West. Apparently the tumor began in the nucous membrane at the junction of the alveolar process and the check and later involved the jaw. The

025

tumor was removed by a surgeon in the West, but the growth recurred immediately, shortly after which patient was admitted to St. Luke's Hospital, where Dr. Halstead resected half of the jaw. This patient had a salivary fistula, from a defect in the duct of the parotid gland. The skin defect in this case was closed in the same way as in the preceding case, by taking a flap from the anterior wall of the chest. The wound healed by primary union, excepting at the opening of the fistula, where drainage was inserted.

The chief reason for bringing these patients before the Society was to get some information as regards the advisability of using a mechanical apparatus of some sort, as a splint, to take the place of half of the jaw, and to prevent the deformity which usually resulted. There had been considerable work done of this kind, one surgeon substituting aluminum, another celluloid, still another hard rubber, and another wire, the splint made to pass from the glenoid cavity to the end of the bone. It was permitted to remain after the wound healed.

Dr. Halstead mentioned a report of six cases published in the Archives of Surgery, 1898, by Brendt, in which a splint had been used, and in four of them the splint healed in the wound without suppuration. In one case the patient went for four years without a fistula, the operator having used a celluloid plate. In this case one-half of the inferior maxilla was resected; the mucous membrane of the mouth was closed by suturing, and skin brought up to cover over the defect. From the cuts given in the Archives of Surgery, there was practically no deformity. The patient's face was symmetrical, without any of the deformity that is present in the case exhibited. If such results could be accomplished, it would be worthy of trial.

DR. ARTHUR DEAN BEVAN recalled a report he saw recently of a case of Kocher's, in which he (Kocher) had resected the central portion of the jaw, and had filled in a considerable defect by a piece of bone taken from the crest of the ilium, with quite a successful result. It looked rather difficult to believe that a large piece of bone would heal in, and yet the preliminary report gave the result in this case as a success; whether with or without periosteum he did not know. It was wired in place; it was taken from the ilium in the same patient.

Dr. Jacob Frank thought that Dr. Halstead should make

an effort to close the salivary fistula, as the discharge from such a fistula, he thought, would eventually produce carcinoma. He thought it would be wise to sectire healing as soon as possible, for, if the glands were cleaned out and there was no return of the disease from the old trouble, there would be a recurrence from the constant irritation of the saliva flowing over the skin

DR HALSTEAD said, in regard to the remarks of Dr Bevan relative to Kocher's operation of taking a piece of bone from the ilium etc, that this operation was performed a good many years ago by Schlatter, of Zurich, who took a bone graft from the thia, which resembled half of the inferior maxilla, taking perios teum with it, and, having planted it, it grew successfully. The operation for filling in a defect where a piece of the central part of the jaw was removed was much simpler than to fill in a defect where half of the taw was removed.

ACTINOMYCOSIS

DR ARTHUR DEAN BEVAN read a paper with the above title, for which see Annals of Surgery for May

DR JOHN B MURPHY thought that an important feature brought out by Dr Bevan was the demonstration of the lymphatic involvement. In none of the cases that came under his observation was it shown that the lymphatic glands became in volved, or that the infection was transmitted through the lymphatic chain and arrested in the lymphatic glands.

Another point brought out was the enormous infiltration that occurs around a small focus of suppuration. This was one of the first things that attracted Dr. Murphy a tention in the first case he saw in 1883 (and was the first case in the human subject recognized in this country). This was a typical case of actinomycosis of the jaw in which the infiltration extended down to the neck and infiltrated the neck to the extent of an inch or more on each side. There was apparently a small fluctuating focus When this area was opened, a number of yellow bodies escaped in the few drops of pus. These all appeared moulded. They were not round, not oval, but moulded and flattened. The specimens he saw at that time under the microscope showed a single star or radiating appearance. Drs. Belfield and Fenger saw the specimens from his first case, and also from the second case of actinomy cosis of the jaw, which came under his observation a

short time after the first. The infiltration described by Dr. Bevan in his case of actinomycosis of the pelvis was one of the classical conditions of this disease in the cellular tissue or peritoneum. While the disease seemed to affect bones, muscles, and destroying the tissues with which it came in contact, it elected fatty tissues, and passed by preference along the fatty tissue tracts, not involving skin, muscle completely, or bone, lifting its periosteum, attacking the periosteum, or attacking the fatty tissue close to the periosteum without attacking the bone, *i.e.*, it rarely produces a true osteitis.

The results of treatment had not been very satisfactory. So far as he could tell, his first, second, and third cases recovered; but the fourth case he saw did not recover. This was one of peritoneal actinomycosis where the micro-organisms escaped either through the stomach wall or transverse colon, to appear in the gastrocolic omentum and adjacent peritoneum. There was no perforation in the stomach wall, and none in the large intestine. There was infiltration of fatty tissue on both sides; the micro-organisms passed up into the diaphragm and beneath the surface of the liver.

Of cases of actinomycosis of the appendix he had had two, one of his own, and another which he saw in connection with Dr. Lee. In the first the actinomycotic process was confined practically within the appendix. Recovery followed extirpation. The case he saw with Dr. Lee pursued an entirely different course. It appeared first as a peri-appendicular abscess under the abdominal wall; it was opened and drained, and the actinomyces were recognized. The process continued to burrow; the sinuses burrowed in all directions down the thigh into the pelvis, over the anterior surface of the bladder to the opposite side, up along the spine, and behind the sacrum. The patient was under observation five or six years; had been subjected to all of the varieties of treatment then in vogue, such as curettement, the application of nitrate of silver, iodide of potash, etc., and the last he heard was that the patient was still having new sinuses, showing that the element of individual resistance had as much to do with the prolongation of life as the element of treatment, and he was pleased to have Dr. Bevan bring that point out in his paper. It was his conviction that there was no specific effect produced by medication so far advised.

DR E WYLLYS Andrews thought we would have to revise some of our ideas in regard to the curability and frequency of actinomycosis Dr Bevan had had in one year more cases of actinomycosis than had often been reported by any one surgeon in that length of time, and a larger per cent of cures

It had been the rule probably with all surgeons to make a quick and easy diagnosis in what might be termed the typical and bad cases. Surgeons saw the wooden hardness of the mass, the absence of temperature, and opened the mass, expecting to see the yellow granules, but perhaps did not find them. Specimens were then sent to a microscopist or to the laboratory, and if the ray fungus was not found, the case was put down as not one of actinomycosis. This had been his experience with this disease However, by being more careful personally in studying the cases, instead of trusting assistants and making repeated examinations he had found the mycotic threads. Furthermore, surgeons up to a short time ago looked too much for typical swellings of the jaw and neek, or protruding abseess in the maxillary region, and overlooked the remoter parts. We have been obsessed by the veterinary word "lumpy jaw".

One could not help noticing the large percentage of recoveries that had been referred to by the writer, which was quite contrary to his own experience in the rather limited number of cases he had seen during the past few years. Most of the cases he had seen had either died, or, if they were living, there was an increasing actinomycotic mass in some part of the body. He recalled one man who had a mass in his chest and who, he thought,

was going to die

As to the botanical place of this fungus, it was a parasite on the grass and grain family. It entered the organism through the mouth, except where it entered through some abrasion of the skin. This did not mean that actinomycosis always occurred in the socket of a decayed tooth, spread to the jaw, and mothed the neck and so on down into the body, but it meant that some of the fragments of the fungus were adherent to matter ingested or inhaled, and gained access to the respiratory tract or to the alimentary canal. If one would unalyze all the cases of actino mycosis of the alimentary canal, he would find scarcely one in the stomach. The probabilities were that the acidity of the stomach prevented the active generation of the germs there. A

comparatively small number was found in the upper intestine. In nearly one-half of all cases reported the actinomycoses were found in the cæcum and in the appendix. Personally, he had not seen a case of actinomycosis like the one reported which involved the rectal region. The cases which he had seen had shown in a few instances bright yellowish, fish-egg-like bodies. Oftener they appeared dark brown. He had also seen bodies that were greenish brown, or with a distinct green cast to them, like sturgeon roe, but more minute.

Dr. M. L. Harris said the essayist had correctly stated that actinomycosis hominis was much more common than we had supposed. One reason why it had not been more frequently recognized was that we were led to look for actinomycosis about the face, neck, and mouth because the first cases were observed in these regions, and we came to look upon those places as the proper field for actinomycoctic infections. Soon we found it in connection with the intestine, and with the respiratory tract, but still looked for an infection always from the surface. It was now known that we might have hæmatogenous infections. While we know that actinomycosis must have gained entrance from the surface at some point, still, it might not have produced any local evidence of the infection at the point of entrance.

He had seen during the past year three cases of actinomycosis which apparently were hæmatogenous infections. The first was in a young lad, a country boy, who came into the hospital with a slowly developing swelling in the prevesical space. It had the characteristic hardness. He opened the mass and obtained a small amount of pus. Inoculations from the pus gave a pure culture of the staphylococcus pyogenes albus. In the first pus which was evacuated, no granules were recognized; but on the dressings a few days after the characteristic granules were at once recognized, and when submitted to the microscope demonstrated to be actinomycosis. This case progressed; the exudate spread; sinuses and fistulæ were formed about the abdominal wall into the lateral wall of the pelvis. He was operated on several times, and these tracts thoroughly cleared out, and during the operations the abdominal cavity was opened, because the speaker was suspicious all the time of a primary intestinal origin. The abscess did not originate in the appendix, nor could he find any point of the intestinal tract that was involved, so he was

unable to explain how the infection reached the prevesical space except through the blood. The patient was subjected to all of the recognized treatments. Indue of potash was given internally continuously and interruptedly. He was given \(\lambda\) ray treatment very thoroughly, but in spate of all treatment he progressed from bad to worse and after a period of several months died. A pecularity of this case was the very marked reduction of the hamoglobin. The red cells were not reduced in number, about 4,500 ooo to 5,000,000, but the hamoglobin was reduced to a low point before he died.

The second case was in a woman (Chicago woman) who had not lived in contact with any cattle or farm yard in any way The disease ran a very slow course, with some pyrexia, the exact cause of which could not be recognized for some time Finally, a swelling appeared a little to the left of the mid line just below the costal arch Tlus was present when he first saw her He thought it was an abseess he operated on her, opened the abdomen and found the swelling was in the centre of the left lobe of the liver He opened it up expecting to get pus but found none He found a mass from six to eight centimetres in its longest diameter, and four or five centimetres in its short diameter. He removed a portion of this tissue for microscopic examination and closed the wound The section showed a mass of degenerated epithelial liver cells undergoing karyorhexis, with loss of staining properties and round cell infiltration. From a culture he obtained a long spore producing bacillus, but was not able to identify it as any recognized pathogenie organism She got no better, she soon developed empyema which he opened, and then obtained actinomycotic granules He also obtained from this pus the same spore forming bacillus which he had obtained from the liver This patient was put on the same line of treatment, todide of potash, etc., but she progressed from bad to worse, so that after several months she died

A third case was under his care at the present time. This patient run an indefinite history for three or four months, and then cane under his observation. He saw the case with Dr Patton. There was a distinct enlargement in the region of the liver, projecting downward and displacing the kidney anteriorly. He resected the ninth rib and opened an abseess in the right lobe of the liver. Inoculations from this pus were sterile. He got no the liver.

growth. In the first pus which escaped no granules were recognized, but when he was watching the dressings a few days after he recognized at once the granules in the discharge. The microscope proved them to be actinomyces. The patient was then put on the iodide of potash. She had progressively grown worse; the disease had involved the lung; she had had an irregular pneumonia in patches, with collapse of a portion of the lung; expectoration bloody. She was still under treatment, but getting worse. This patient showed the same marked reduction of the hæmoglobin. The red cells continued up to 5,000,000, and had all the time. She had marked leucocytosis, the leucocytes varying from 18,000 to 23,000.

These three cases seemed to him to be instances of hæmatogenous infection, the organisms having been carried through the blood, with no local point of invasion, so far as could be determined. These cases showed that there was less resistance to this infection in some patients than in others. The X-ray was used in connection with the iodide and other treatment, yet all three declined; two of them died, and the third probably will before long.

Dr. A. J. Ochsner emphasized some of the points brought out by Dr. Bevan,-first, the diagnosis. He agreed with the essayist that there were a great many cases of actinomycosis in this vicinity, and most of them were not accurately diagnosed. He was interested in actinomycosis because in 1886 he was examining the sputum of a patient for tubercle bacilli and found actinomyces. His attention had been directed to the disease by Dr. Murphy's observations at that time. Dr. Belfield and Dr. Fenger at that time were greatly interested in the case. The case was reported to the Chicago Medical Society, and since that time he had been looking for cases of actinomycosis and had found many of them. He was almost never without a case. He had one at the present time. He recalled over a dozen cases in which the face and neck were involved; one affected the larynx; a number involved the abdomen; one the eighth rib; others the appendix, etc. He had had two or three cases of actinomycosis of the lungs. He had asked a number of these patients what disposition they made of their lumpy-jaw cattle, and invariably the answer was, "We try to sell them. If we can't sell them, we kill them, sell the meat, and it is peddled about and eaten by

different people." He had come across cases in which he was morally certain that the infection came from eating some of this meat that had been peddled about in that manner

With reference to treatment, be believed that surgeons should follow the methods employed by veterinary surgeons if they wished to succeed in treating actinomycosis. In late cases of actinomycosis in cattle, the veterinary surgeon had the animal killed, he never tried to cure a late case of this disease in cattle In the early cases an effort was made to remove the entire mass by excision or by splitting it open and curetting it, followed by the administration of rodde of potash in a definite way. If the rodde of potash was given in a case of actinomycosis in the human being, in the manner in which it was administered to cattle, he had no doubt a cure could be effected as readily in man as in animals. Veterinary surgeons gave a large quantity of iodide of potash for several days in succession, and then they interrupted its use for one week, giving the spores time to develop into ray fungs, after which they repeated the sodide of potash for three days, then withdrew it for a week again, and repeated it again, in cases where the actimomycone process was localized, the cattle would get well. This was the way in which one should treat a human being with this disease. About eight or nine years ago the speaker followed the method of giving the iodide of potash in increasing doses, but in several cases in succession there was an increasing doses, but in several cases in succession there was apparently no effect upon the actinomycosis until he reached a dose of a drachin, three times a day and then the progress of the disease began to be arrested. He remembered the first case in which he was impressed with the importance of large doses in oddied of potash very vigorously, and this was an instance in which he operated a dozen times. It was a case of actinomycosis of the scalp The disease burrowed and burrowed, and every week or so he scraped the scalp more and more and applied every remedy he could think of, without much improvement However, when he got up to sixty grains of iodide of potash, three times a day, the disease showed manifestations of arrest of development The next case he had acted in exactly the same way, and since the next case in and actor in exactly the same way, and since that time he had made it a rule to give minety grains of folded of potash in a half pint of hot milk, followed by a pint of hot water, at six in the morning, two in the afternoon, and ten at night, for as many days as the patient can bear taking it up to one week

If the patient could bear it for a week, it was withdrawn for a week, after which it was repeated for three or four days, then withdrawn again, and repeated once a month. The reason why he repeated iodide of potash once a month was this, that in one of his fatal cases he did this for a time and the patient was apparently well; but about two years later he had a recurrence and died of the disease, there being a circumscribed encysted abscess in the lower end of the right pleural cavity.

Another case was one of actinomycosis of the neck seen six or seven years ago, in which he curetted, gave iodide of potash, etc., in the manner he had just mentioned, and the case did well for two or more months afterwards. In short, the patient seemed to be entirely well. He did not take any iodides for a year, when recurrence took place in the larynx, with ædema of the larynx. The patient returned, as he was almost suffocated. Dr. Ochsner curetted again, gave him iodide of potash in the manner described, continued it for a year, and the patient had been well for four years, to his knowledge. He heard from him last week.

Dr. Carl Wagner said, regarding the liability of the operator occasionally to infect himself during an operation for actinomycosis, that one of the pupils of Professor Sacchi, surgeon-inchief of the Doges' Hospital of Genoa, Italy, had the misfortune of touching his nose after evacuating an abscess (actinomycotic) of a patient before disinfecting his hands, and thus infected himself. He succumbed very shortly to a fulminant actinomycosis.

The report of one of the cases of Professor Bevan in which the lymphatics were extensively involved recalled a case in his own experience in which serious complications in the form of angina Ludovici following an infection of the lower jaw and parotids, with actinomycosis, required an operation. The patient, a farmer, entered the hospital one Sunday afternoon with symptoms of choking and suffocation. An examination revealed a double swelling, one underneath the chin, very hard and persistent, and another one at the region of the parotids and lower jaw, semi-fluctuant. Both abscesses contained the typical sulphuryellow miliary bodies of actinomycosis. Evacuation of the abscess, curettage of the cavities, swabbing with Lugol's solution, and hot compresses of boric acid yielded a very satisfactory result in this case. The patient was in the habit of chewing the ear of

the corn while walking through the fields, and undoubtedly contracted his disease in this manner

DR L L MCARTHUR referred to a case the history of which he had just completed for publication in the St Luke's Hospital Reports. It was interesting in this, that it had almost the classical course, and also showed a great variety of lesions.

The patient was a young woman, a great golfer, out of doors very much, who frequently was rebuked by her husband for plucking at hay and chewing it while playing. She developed a probable actinomycosis of the alveolar process, which required three or four months' treatment before it could be made to heal by a dentist. No actinomycotic infection of the jaw was recog nized by the dentist, but only its inveterate character noted. Nine or ten months later, while playing golf in the South, she began to have pain in the right iliac region, and this pain continuing being of a rather colicky character, on her return home she con sulted Dr Cary, her family physician Feeling a mass there and noticing she had elevation of temperature, he sent her in to Dr McArthur's service at St Luke's Hospital, believing it to be a probable appendiceal abscess, although it was movable, as some of the appendiceal abscesses are when wrapped up in a mass of omentum Dr McArthur considered it a case of anoendiceal abscess and advised operative interference. On opening the abdomen, there was found a tumor of the ileocæcal region, involving the appendix, ileum, and cacum for a distance of four or five inches on the cæcum. This tumor in its clinical aspect, although presenting no miliary bodies on it, seemed to him to be an hyper trophic tuberculosis On that basis, with the consent of the family physician, he made a resection of the entire ileocæcal region, implanting in the side of the hepatic flexure of the colon the resected ileum. On lifting up from the diac fossa this mass, a few drops of pus were seen on the fascia covering the iliac muscle This was mopped up, drainage provided for, and the wound closed. The wound healed after three weeks the patient left the hospital, and for three months was quite well, when she began to have a cough, with high temperature, chills and night sweats During his absence from the city she was seen by his assistant, Dr Hollister, who considered the case, although he was unable to demonstrate tubercle bacilli in the sputum, one of acute tubercular trouble, the patient having lived in the house of a patient who had died a few months before with tuberculosis, and many of her living things still being in the house, such as bedding, clothing, etc. On Dr. McArthur's return, the patient being extremely ill, he saw her, and found a tender area, with an enlargement in the neighborhood of Reidel's lobe of the liver. Considered the condition one of hepatic abscess with burrowing through the diaphragm and expectoration. He urged operative interference. The husband refused to have any operation performed until she had become extremely run down and had a temperature varying from 103° to 106° F. for three or four weeks. Then, at his urgent solicitation, the patient was brought to the hospital. He made an incision over this area, and found an abscess which had perforated the posterior sheath of the rectus muscle, in which were then to be seen for the first time the typical granules, and the nature of the case became clear. The patient lingered along for about two weeks, finally dying. A careful post-mortem examination was made by Dr. Hektoen, and a very thorough report of the case was made. In the sputum there was always to be found the typical leptothrix-like threads, but never any suspicion was had of granules. In the abscess opened there were typical granules to be found, and from them cultures were made which proved typically characteristic, so that here was a person in the habit of chewing straw, grain, and hay, who had disease of the jaw, who had a hypertrophic actinomycotic infection, which often is indistinguishable from tuberculosis, who recovered from that, and later developed abscesses, with perforation of the diaphragm. Post-mortem examination showed multiple stomach abscesses burrowing into the diaphragm, and miliary abscesses along the bronchi.

In regard to these club rays, he learned from the paper which Dr. Bevan referred to, namely, that by Dr. Hektoen, and by personal conversation, that the ray was considered now an involution form of organism, not really the typical or characteristic organism in itself.

He was constrained to urge that cases be not considered cured, although healing has taken place, and they have been presented to a medical society. He once presented a case of actinomycosis of the breast and chest wall to the Chicago Medical Society as cured. This case required extensive resection. Three or four weeks after he presented it new fistulæ formed; the

patient lingered so long in the hospital that finally the hospital authorities felt unable to keep her there longer. All of the recog mized treatments were trued, the patient gained in weight, but the fistulæ persisted. After leaving the hospital and having been out of it for six months or more, he was called to her bedside in her last illness finding this very peculiar and unusual condition, namely, that she had a pootjaneus pjæmia. The palms of the hands and soles of her feet had multiple, round, small, Frencheas iszed abscesses, of a blue green color, that made it to him extremely difficult to decide what she had. Having a bistoury with him, and these tumors seemed to fluctuate, he took some of the material, recognized that he had abscesses containing Bacillus pyocyaneus and demonstrated it. The majority of these abscesses showed upon the soles of the feet and on the palms of the hands, it was on account of these that he was called to see her.

Encouragement from medicine and the use of the X-ray, or from anything at present known was not to be relied on as curative. He thought the impression should not go forth from the Society that the cases presented by Dr. Bevan were cured. One patient of Dr. Bevan's as he understood it, might have had pull monary invasion, but this was not demonstrated, although under the iodide of potash and local treatment the actinomycosis of the neck disappeared. Furthermore, he did not understand that the other cases were reported as cured, and certainly the patients presented were not cured.

FERFORATING GUNSHOT WOUND OF ABDOMEN WITH MULTIPLE INTESTINAL PERFORATIONS, OPERA-TION RECOVERY

DR E J SENN reported the case of a man, aged twenty-four years, street car conductor, who, during an altercation with a negro, was shot in the abdomen with a 38-caliber revolver. The conductor was standing on the rear platform while his adversary stood on the ground six feet away. The shooting took place at 6 30 P M, March 18, 1904. The patient had partaken of a hearty dunner at twelve o'clock. Shorth before the accident he had caten two apples. The wounded man was brought to the Presbyterian Hospital immediately. Dr. Senn saw him first at 730 P M, one hour after the accident. His appearance was bad.—blanch.do

face, anxious expression, pulse quick and thready, and respirations fast and shallow. Examination revealed a large bullet wound located about one inch above McBurney's point. The abdomen was distended with blood, and there was considerable bleeding from the wound. There was dulness in the flanks and some absence of liver dulness. Catheterization yielded several ounces of clear urine.

Immediate operation was decided upon; ether anæsthesia; median incision. Upon opening the peritoneum there was a gush of dark blood and the escape of gas. Large compresses were packed into the abdominal cavity, and the first loop of intestine which presented itself was seized, which proved to be the lower portion of the jejunum. This was given to an assistant, and a search for perforations was made. The intestine was traced in a proximal direction. Four perforations were found and sutured with two rows of stitches, the first through all the coats, and the second with Lembert. Two rents in the mesentery were next closed. In the upper portion of the jejunum the intestine was so badly injured, as well as the mesentery, that resection was necessary. A fine cambric needle with fine silk was used in the circular enterorrhaphy, as well as in the repair of all perforations. Beginning at the mesenteric border, a row of continuous Lembert through-and-through sutures was inserted, and then with the needle armed with the same suture a row of Lembert sutures was introduced. The intestine was next followed to the pylorus. The stomach was slightly distended and intact. Hæmorrhage continued from the left lumbar region. At a point about four inches below the left iliac crest there was a rent in the parietal peritoneum. Examination showed the bullet lying in the soft tissues external to the ilium, having punctured that structure. The left kidney was palpated and found intact. Examination was now continued in a distal direction from the fixed point first held by the assistant, and two perforations were discovered in the ileum and three in the ascending colon near the hepatic flexure. As the patient's condition was now critical, the latter were closed with one row of sutures and the neighboring omentum attached over the line of suture with a few stitches. If the patient's condition had permitted, he would have resected the colon, as the damage to the intestine was extreme. One more perforation in the cæcum was closed. In this locality some fæcal matter as well as several

kernels of sweet corn were found in the abdominal cavity. The abdomen was now carefully leansed by dry sponging, particular care being taken to raise the intestines out of the pelvis in order to remove all blood clots low down in that cavity. Two large gauze drains were inserted, one to the lowest portion of the pelvis, the other towards the left linae fossa, where there was considerable oozing. The bullet wound was disinfected and sutured. The wound closed. Patient returned to bed. Pulse, 140, temperature, of 6° F. respirations, 26

During the following two days, strychnine, gr 1/22, salt solution containing one ounce of whiskey, was administered every four hours. Bowels moved on the second day with a simple enema. On March 20, 21, and 22, the patient had constant his cough and vomited feeal matter. The strychnine was reduced to gr 1/30. Enemata of molasses and nulk, one pint of each, resulted in good bowel movements, and the patient soon passed out of danger.

Dr Senn showed skiagraphs of this case, one of them showing the location of the bullet

In these cases he believed in using fine silk as suture material, allowing hie was aware that a great many surgeons at the present time preferred catgut. He thought catgut had its place in surgical work but when it came to intistinal suturing the use of silk was much more reliable. He also preferred a cambric needle, although the surgeons at the Presbyterian Hospital used a curved surgical needle for intestinal suturing. In introducing the Czerny-Lembert suture, the cambric needle facilitated it to a very large degree.

He also called attention to the use of the omentum in grafting. He was particularly interested in this line of work, having made experiments on dogs, and having reported them to the Society at a previous meeting. In making experiments on animits death resulted in each case, but at that time he reported a case of appendicults, with fishulous opening in which the defect was closed with omentum. In this instance he was compelled to use this method, because the patient was in such a bad condition that surgical work had to be done expectitiously. He made use of one row of through and through sutures. He put one or two stitches through the omentum covering the first row of stitches. He did not expect the patient to recover, thinking that later on there

would be perforative peritonitis. In doing enterorrhaphy, he resorted to through-and-through stitches, and then using the same needle armed with the same thread he made a row of Lembert sutures. This enterorrhaphy was done quickly with the use of cambric needle and silk, and he said he could do an ordinary enterorrhaphy as quickly as one could make an anastomosis with the Murphy button. However, in using the button one might save a minute or two of time.

In regard to drainage, he believed that all cases in which there was perforative peritonitis should be drained. He urged that particular attention be given to thorough cleanliness of the abdominal cavity, but he did not believe in free irrigation by salt solution, as this solution had a tendency to disseminate any material which might remain in the abdominal cavity, and thereby a good deal of harm might be done.

A large piece of gauze was inserted well down in the pelvic cavity, and another away over to the opposite side.

In cases of injury to the intestine, the surgeon should be very systematic in his search for perforations. Unless one was methodical, he was very apt to overlook some perforations.

He emphasized the form of enema that was used in this case. This enema was a combination of molasses and milk, one pint of each. In many postoperative cases where he had been unsuccessful in using enemata of turpentine or Epsom salts, he had been successful with molasses and milk. It was agreeable and soothing to the patient. He hoped the members would try this whenever they had inveterate postoperative cases. In one case of intestinal obstruction upon which he was prepared to operate, he succeeded in removing the obstruction with molasses and milk.

Awarded 60L0 MEDAL Louisiana Purchase Exposition

LISTERINE

Awarded
60L0 MEOAL
Louisiana
Purchase
Exposition.

A non-toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution, sightly, pleasant, and sufficiently powerful for all purposes of asepsis: these are advantages which Listerine embodies.

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine.

LISTERINE DERMATIC SOAP

An antiseptic detergent for use in the antiseptic treatment of diseases of the skin.

Listerine "Dermatic" Soap contains the essential antiseptic constituents of eucalyptus (1%), mentha, gaultheria, and thyme (each \(\mathcal{E} \), which enter into the composition of the well known antiseptic preparation, Listerine, while the quality of excellence of the soap stock employed as the vehicle for this medication will be readily apparent when used upon the most deliciate skin and upon the scalp Listerine "Dermatic" Soap contains no animal fats, and none but the very best vegetable oils; after its manufacture, and before it is "milled" and pressed into cakes, a high percentage of an emollient oil is incorporated with the soap, and the smooth, elastic condition of the skin secured by using Listerine "Dermatic" Soap is largely due to the presence of this ingredient. Unusual cate is exercised in the preparation of Listerine are added to the soap after it has received its surplus of unsagnified emollient oil, they retain their peculiar antiseptic virtues and fragrance

A sample of Listerine Dermatic Scap may be had apon application to the Manufacturers—

60LD MEDAL Louisiana Purchase Exposition

Lambert Pharmacal Company, St. Louis, V. S. A.

Awarded
60L0 MEOAL
Louisiana
Purchase
Exposition.

Garrigues

An entirely new work

Gynecology

By HENRY J. GARRIGUES, A.M., M.D.,

Gynecologist to the St. Mark's Hospital, New York City; Consulting Obstetric Surgeon to the New York Maternity Hospital; Honorary Fellow of the American Gynecological Society; formerly Professor of Gynecology and Obstetrics in the New York School of Clinical Medicine; Professor of Obstetrics in the New York Post-Graduate School and Hospital.

Octavo. 462 pages. 328 illustrations. Cloth, \$3.00

R. GARRIGUES'S ability as a gynecologist and writer is well known, and in this entirely new work he has devoted the largest share of his attention to *Medical* Gynecology.

To the practitioner desiring to acquaint himself with the present status of modern gynecology, and the physician willing to refresh his memory or learn the latest details in treatment for a particular case in hand, the book will appeal with peculiar force.

Dr. Garrigues's exceptional facility for imparting knowledge and writing concisely is best exemplified in this his latest work. No space has been given to the history and progress of the science and practice of gynecology, no case histories nor bibliographies have been introduced as padding, but the space so saved has been devoted to differential diagnosis and treatment.

The author teaches how to recognize the nature of the disease or condition, and how to attack it with medical, electrical, or surgical remedies. Minor operations which the general practitioner is likely to undertake are described with minute detail. In regard to the others, the chief features are indicated.

The work embraces the abnormalities of all the organs in the female pelvis, inclusive of the urinary organs and the rectum, excepting those conditions which are connected with pregnancy and childbirth, described in the author's work on obstetrics.

The plan is laid in such a way that the leader is gradually led from the simple and easy to the complicated and difficult. For this purpose the book is divided into a general and special division. In the latter the anatomical order is followed, beginning from the outside. For practical purposes, special chapters on hemorrhage, leucorrhæa, and sterility are added.

The text is elucidated by a large number of illustrations, many of which are original and based upon the author's own researches, dissections, and operations.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

Nurses' Guide



TO

Surgical Bandaging and Dressing Cloth, 75 cents

By WM. JOHNSON SMITH, F.R.C.S.
Principal Madical Officer, Seamen's Hospital, Greenwich

IN writing this small work, the author has endeavored to provide a ready and complete pocket reference book for students and nurses in surgical wards. The scientific principles upon which the modern treatment of wounds is based are fully explained, so that the instructions in dressings and bandaging may be intelligently followed. In order to make these explanations as clear as possible, the volume has been profusely illustrated.

ONTENTS

TY.

- I THE MODERN TREATMENT OF WOUNDS
- II Wound Infection and Sepsis
 III Antiseptic and Aseptic Surgery
- IV Antiseptic Treatment of Wounds —Sterifization by heat Antiseptic and aseptic dressings.
 - V THE OPERATING ROOM AND HIS CON-TENTS
- VI PREPARATIONS FOR A SURGICAL OFFER
 ATION —Preparation for an operation
 in a private house Duties of the nurse
- after the operation

 VII TREATMENT OF WOUNDS Inflamed or
 septic wounds The value of the chuical
 thermometer in cases of recent wounds
- VIII TREATMENT OF BURNS AND SCALDS

- TREATMENT OF ULCERS

 BANDAGING -The toller
 - BANDAGING -The toller bandage
 COMPOUND FORMS OF ROLLER BANDAGE
 - -The triangular bandage Fixed or movable bandages
- XII KNOTS AND STRAFFING -Strapping
 \(\text{III}\) SPLINTS -For the upper limb For the
- lower limb Flexible and moulded splints. First aid or emergency splints.

 VIV Vorsing 1 Cases of Injury Injuries
 - to the head Injuries to the chest Injuries to the abdomen Fracture of the spine Injuries to the upper extremity Injuries to the lower extremity
 - V THE TEMPERATURE AND THE PULSE INDEX

J. B. Lippincott Co. Philadelphia . since 1792
Our new Catalogue Is well worth having-sent on request

When writing please mention Allan of Strong

INTERNATIONAL CLINICS

A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Opthalmology, Otology, Rhinology, Laryngology, Hygiene,

And other topics of interest to Students and Practitioners by leading members of the medical profession throughout the world.

Edited by A. O. J. HELLY, A.M., M.D., Philadelphia, Pa., U. S. A.

With the collaboration of WILLIAM OSLER, M.D., Baltimore; JOHN H. MUSSER, M.D., Philadelphia; JAMES STEWART, M.D., Montreal; JOHN B. MURPHY, M.D., Chicago; A. McPHEDRAN, M.D., Toronto; THOMAS M. ROTCH, M.D., Boston; JOHN G. CLARK, M.D., Philadelphia; J. W. BALLANTYNE, M.D., Edinburgh; JAMES J. WALSH, M.D., New York; JOHN HAROLD, M.D., London; EDMUND LANDOLT, M.D., Paris; RICHARD KRETZ, M.D., Vienna; with regular correspondents in Montreal, London, Paris, Berlin, Vienna, Leipsic, and Brussels.

Illustrated in colors and black and white. Cloth, \$2.00 Octavo. 300 pages per volume. per volume; \$8.00 per year. Half leather, \$2.25 per volume; \$9.00 per year.

CONTENTS, VOL. I, SERIES 15, APRIL, 1905.

TREATMENT

The Treatment of Cardiac Asthma. By P. Merklen, M.D.

The Treatment of Cirrhosis of the Liver, Unusual Syphilis, Tuberculosis, Suffocating Catarrh, and Mucomembranous, Enterocolitis. By Albert Robin, M.D.

Therapeutic Indications in Infected Cholelithiasis. By A. Chauffard, M.D.

MEDICINE

The Carbohydrates of Human Urine, in Health and in Disease. By Carstairs Douglas, M.D. The Eye and the Hand in the Diagnosis of Heart Disease. By Jas. J. Walsh, M.D. The Early Diagnosis of Heart Disease in Children. By J. Porter Parkinson, M.D. Aortic Stenosis; Adherent Pericardium. By Morris Manges, M.D. Intestinal Adhesions and the Report of a Case Illustrating Elasticity of the Hepatic Support (Hopatoptosis). By A. L. Benedict, M.D.

SURGERY

Skin Grafting in the Late Treatment of Severe Burns Involving Extensive Areas of Skin. By Archibald Young, M.B.

The Starvation of Malignant Growths by Depriving them of Blood Supply. By Robert H. M. Dawbarn, M.D.

A New Operative Method for the Total Extirpation of the Larynx. By Francesco Durante, M.D. The Treatment of Knee Joint Disease. By Russell A. Hibbs, M.D. The Treatment of Glenard's Disease. By A. Ernest Gallant, M.D.

NEUROLOGY

Morphinomania, Cocomania, and General Narcomania, and Some of their Legal Consequences. By Charles K. Mills, M.D.

A Case of Cerebellar Tumor. By J. Walter Carr, M.D.

Two Cases of Ocular Palsy in both of which the Paralysis was Probably Dependent upon a Lesion in the Neighborhood of the Sphenoidal Tissure. By Edwin Bramwell, M.B.

OBSTETRICS

Anterior and Posterior Parietal Presentations of the Head in Slightly Flattened Pelvis. By Robert Jaidine, M.D.

PROGRESS OF MEDICINE

Treatment. By A. A. Stevens, M.D.

Mcdicine. By David L. Edsall, M.D., and Wm. B. Stanton, M.D.

Surgery. By Joseph C. Bloodgood, M.D.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

When writing, please mention Annals of Surgery.

NEW! IMPORTANT!

Every Physician and Hospital should have THE RIVA ROCCI

SPHYGMOMANOMETER



Mod fied by DR H W COOK

Plain form for hos- \$6.50 pital use

Portable form, with jointed manometer, in small plush-lined case for general use

MANUFACTURED SOLELY BY

EIMER & AMEND, 205 211 Third Ave New York

The MIDLAND ROUTE



__ RETWEEN -

Denver, Cripple Creek,

Leadville, Glenwood,

and Salt Lake City is

THE PEER OF SCENIC ROADS
BEST EQUIPMENT—FINEST ROADBED

P S—Send for illustrated booklet on Colorado as a health and pleasure resort to

C H SPEERS Con Pan Agr DENYER

What is Your Favorite Germicide?

Is it mercury bichloride? Alphozone is better, because, while equal in germicidal strength, it is nonpoisonous and does not form an insoluble precipitate with albumin.

Is it carbolic acid? This, too, is poisonous, and continued use often causes inflammation or hardening of the tissue. Alphozonc is 75 times stronger as a germicide and has none of the disadvantages of carbolic acid.

Is it hydrogen peroxide? It decomposes readily and is very bulky. Alphozone is stable; is a powder and therefore convenient to carry; and its solutions do not effervesce, therefore they may be used in cases where hydrogen peroxide solution would be undesirable because of its effervescence. Alphozone is 3300 times stronger as a germicide than U.S.P. hydrogen peroxide solution.

Is it Alphozone? If so you have chosen the best. Alphozone (succinic peroxide (COOH.CH₂.CH₂.CO)₂O₂) has not only the advantages already mentioned, but presents a more desirable combination of physical and chemical properties than any other germicide. It is a soluble powder. Its solutions are odorless and colorless. It is adapted to both internal and external use, wherever a germicide can be brought in contact with the pathogenic microorganisms present.

A small book that we have just issued discusses the chemistry, bacteriology, and therapy of Alphozone in a very interesting way, and we take pleasure in sending a copy, and a sample of Alphozone (powder or tablets), to any physician on request.



WINDSOR, ONT-LONDON, ENG. NEW YORK. CITY.



St. Winifred's Hospital,

SAN FRANCISCO, CALIFORNIA

A New FIRE-PROOF Hospital with Fifty Sunny Rooms Centrally located. The most Modern Operating Rooms in the West. A Private Sana tonium for Medical and Surgical Cases WINSLOW ANDERSON MD MRCP Lend etc.

Winslow ANDERSON MD MRCP Lend etc.

EUREKA SPRINGS, ARKANSAS.

On the summit of the Ozark Mountains, altitude, 2,000 feet

WATER COLD, PURE, CLEAR, Wonderfully cura tive, not medicinal

CLIMATÉ. Mean Temperature Spring and Summer, 68° 209 clear days annually

SURROUNDINGS Delightful Mountain Scenery Endless drives through pine forests

HOTELS Excellent, affording
ample accommodations
Moderate prices throughout

One Night From St Louis.



PERRY GRIFFIN 111 South 9th St PHILADELPHIA PA

IAL S RAY G E P A 401 Sroadway New

THE POMEROY FRAME TRUSS-FOR HERNIA



Our Specialty is the fitting of trusses by the Frame method

We guarantee, with this truss, to retain securely and comfortably the hernia of any person referred to us

Difficult cases that have been considered unholdable, are especially solicited. We have such coming to us from all parts of the country, and invariably give them complete satisfaction.

POMEROY COMPANY—NEW YORK TWO OFFICES

With competent attendants in charge

17 UNION SQUARE NEW YORK

and 414 FULTON ST., BROOKLYN

POMEROY COMPANY-NEW YORK

THE POMEROY FRAME TRUSS-For HERNIA

What is Your Favorite Germicide?

Is it mercury bichloride? Alphozone is better, because, while equal in germicidal strength, it is nonpoisonous and does not form an insoluble precipitate with albumin.

Is it carbolic acid? This, too, is poisonous, and continued use often causes inflammation or hardening of the tissue. Alphozone is 75 times stronger as a germicide and has none of the disadvantages of carbolic acid.

Is it hydrogen peroxide? It decomposes readily and is very bulky. Alphozone is stable; is a powder and therefore convenient to carry; and its solutions do not effervesce, therefore they may be used in cases where hydrogen peroxide solution would be undesirable because of its effervescence. Alphozone is 3300 times stronger as a germicide than U.S.P. hydrogen peroxide solution.

Is it Alphozone? If so you have chosen the best. Alphozone (succinic peroxide (COOH.CH₂.CH₂.CO)₂O₂) has not only the advantages already mentioned, but presents a more desirable combination of physical and chemical properties than any other germicide. It is a soluble powder. Its solutions are odorless and colorless. It is adapted to both internal and external use, wherever a germicide can be brought in contact with the pathogenic microorganisms present.

A small book that we have just issued discusses the chemistry, bacteriology, and therapy of Alphozone in a very interesting way, and we take pleasure in sending a copy, and a sample of Alphozone (powder or tablets), to any physician on request.





St. Winifred's Hospital,

SAN FRANCISCO, CALIFORNIA.

A New FIRE-PROOF Hospital with Fifty Sunny Rooms Centrally located. The most Modern Operating Rooms in the West. A Private Sanz

Rooms in the West. A Private Sana tonium for Medical and Surgical Cases WINSLOW ANDERSON MD MRCP Lend etc.

Medical Director

EUREKA SPRINGS, ARKANSAS.

On the summit of the Ozark Mountains, altitude, 2,000 feet

WATER COLD, PURE, CLEAR, Wonderfully cura tive, not medicinal

CLIMATE. Mean Temperature Spring and Summer, 68° 200 clear days annually

SURROUNDINGS: Delightful Mountain Scenery Endless

drives through pine forests
HOTELS Excellent, affording
ample accommodations

Moderate prices throughout
One Night From St. Louis.
Write for * The Summ t of The Ozarka



PERRY GRIFFIN 111 South 9th St PHILADELPHIA PA

S RAY G E P A 401 Broadway New York

THE POMEROY FRAME TRUSS-FOF HERNIA



Our Specialty is the fitting of trusses by the Frame method

We guarantee, with this truss, to retain securely and comfortably the hermia of any person referred to us

Difficult cases that have been considered unholdable, are especially solicited. We have such coming to us from all parts of the country, and invariably give them complete satisfaction.

POMEROY COMPANY—NEW YORK TWO OFFICES

With competent attendants in charge

17 UNION SQUARE, NEW YORK

414 FULTON ST., BROOKLYN

Aft Inquital France Times with cardinates to save Fad POMEROY COMPANY—NEW YORK

THE POMEROY FRAME TRUSS—For HERNIA

SAL HEPATICA

"Sal Hepatica" is a scientific combination of Sodium and Lithium phosphates with the laxative salts of the "Bitter Water." It is very pleasant and most efficient in uric acid troubles and makes an agreeable effervescent drink when dissolved in water. "Sal Hepatica" is being extensively employed as an eliminant of irritating toxins in the alimen-

tary tract. Unlike most saline laxatives, it is not in the least depressing, but on the contrary is a physiological tonic. "Sal Hepatica" is one of the very few laxatives that are permissible in any form and in all stages of kidney diseases, for it is positively non-irritating even when exercising a diuretic and depurating action. Samples from Bristol-Myers Co., No. 277 Greene Ave., Brooklyn, N. Y.

Nerve Disorders.

If your patient suffers from THE BLUES (Nerve Exhaustion), Nervous Insomnia, Nervous Headache, Irritability or General Nervousness, give one teaspoonful four times a day.

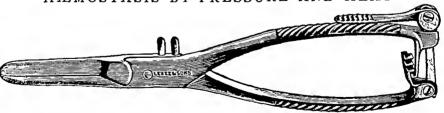
Neurilla is prepared from Scutellaria and Aromatics, and is absolutely harmless even under prolonged use.

Dad Chemical Company, . . New York and Paris.

Surgery Without Ligatures

DOWNES' ELECTRO-THERMIC ANGIOTRIBE

HÆMOSTASIS BY PRESSURE AND HEAT



Four Styles of Forceps, three straight blades, ¼, ¾, and ½ inch wide, and curved blade ¾ inch wide.

Over 600 major abdominal operations performed without secondary hemorrhage.

Forty leading American surgeons are now using them. Write for reprints and circulars.

CHARLES LENTZ & SONS

Manufacturers of Surgical Instruments

18 and 20 North Eleventh St.

Philadelphia

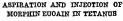
Ambulatory Programatic Splint

Treatment of FRACTURES illo, Thigh, Ence Leg Ankle necs Non-Union; Dislocations; acc or Hip-Joint Discuses.

MEANS TO SURGEONS

Better Care Incressed Practice and Repulation and to the patients confort whe in bed o walk by about and good bone up on in half the time without shorten ag or defarin ty

I terature prices and rental terms to patients Orders a led direct or through your dealer AMBULATORY PREUMATIC SPLINT MPG CO 169 E Randolph Street CHICAGO



By Prof John B Murphy, Chicago A patient treated eight days after infection

was given three full doses of tetame serum, but without effect, the convulsions increased and were almost continuous Thereupon a lumbar puncture was made and 16 ec of cerebrospinal fluid withdrawn At the same time 3 cc of the following was injected

Beta Eucain Morphin sulphate Sodium chloride 3 Dist water

This had been sterilized by boiling. The patient elept four hours immediately and through the night one and one-half hours at a time There were only eight spasms in the succeeding twenty four hours A more severe spasm recurring the next morning, another puncture was made, 15 cc of fluid withdrawn, and 4 cc of the above injected This was repeated on the two lollowing days and then with intervals of two days, two more aspirations and injections were made He was discharged as cured ten days later

The quantities of morphin and encain used were exceedingly small, as this was the writer's first case There was no sweating. headache, or collapse, symptoms frequently noticed after lumbar injection of cocain believes the eucain should be increased to ! to a grain at each injection, and this treat ment might be made more frequent Eucain is much safer than cocam, as it admits of boiling, and there is less idiosyncrasy to in toxication Reduction of the spasms pre vents death from exhaustion or interference The diminution of pus in with respiration the aspired fluid would lead one to believe that lessening of pressure sided the fluid in overcoming infection There is no reason why the cerebrospinal cavities cannot be washed out hy salt or other neutralizing solu tions -Abstracted from Journal of the Ameri can Medical Association, July 16, 1904

SPRING TIME IN PLORIDA AND THE CAROLINAS

This is one of the most delightful seasons of the whole year to visit Florida and the famous resorts of Pinehurst, N C , Camden S C . and others of the wonderful Southland, reached most directly by the Seaboard Air Line Railway, the shortest and quickest route between the North and South

Three through Pullman truns daily, in cluding the Famous Scaboard Florida Lim ited, the anickest train ever operated between New York and Florida without change of either passengers or haggage Winter excursion rates now in effect. Special stop over privileges Excellent Dining Car service on all trains Two trains daily to Atlanta for New Orleans, Birmingham and all points in the South west

Write for rates schedules illustrated book lets, and other information J J Puller, District Passenger Agent, No 1411 Chestnut Street, Philadelphia, Pa



FREE Catalogue F.

THE 20TH CENTURY POLYCLINIC TABLE Manufactured by

THE PERFECTION CHAIR CO Indianapotia Ind

ARTIFICIAL LEG
Our Art Catalog contains valuable information on Care and Treatment of Stump Preparatory to applying an Art Limb How Soon to
Apply Art Limbs for Children. Directions for Self Measurement etc stc.

GEORGE R FULLER CO. ROCHESTER, N Y

SAL HEPATICA.

Effervescent uric acid solvent and eliminator atlandates liver topes all intestinal glands pu r fies alimentary tract and improves digestion assumiation and metabobsm It is practically specific in rheumatism gout and bilious attacks Sal Hepatica has no equal for eliminating toxic products from 12 testinal tract or blood and correcting victors or clogged functions Write for free saraple



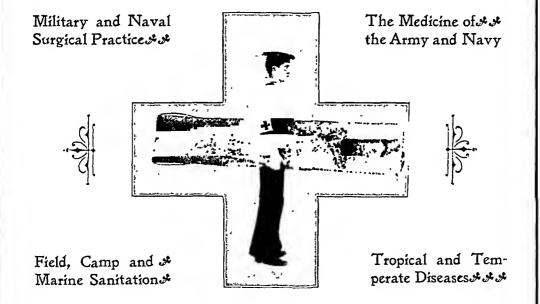


JOURNAL OF THE Association of Military Surgeons of the United States.

EDITED BY

James Evelyn Pilcher, M.D., Ph.D., L.H.D.,

Major and Brigade Surgeon of United States Volunteers, Captain, Retired, In the United States Army.



The Journal of the Medical Officers of the American Public Services in Particular, but of the Highest Interest and Value to Every Practitioner.

Published Monthly, \$3.00 a Year.

Free to Members of the Association of Military Surgeons of the United States.

The Association of Military Surgeons,

DEPARTMENT OF PUBLICATION.

Carlisle, Pennsylvania.



who are not sick but desire their food prepared in an appetizing, wholesome

Particular attention is given to the instructions for serving and garnishing

"This is an excellent and much needed volume not only for hospitals, where it has been used with success but also in the home been been to the success but also in the low the been to the success to the success to the success how also as to preserve the health and digitation of those in her care —The Aey stane, Charleston, S. C.

By Helena V. Sachie Cloth, 91 25, net

At all booksellers, or will be sent postpaid by J. B. LIPPINCOTT COMPANY PHILADELPHIA PUBLISHERS

For the Blues GOLORFCK'S Malt Fxtract

The blue patient be comes still more blue if required to introduce some unpalatable tonic into his daily routine.

Try Something Pleasant

Goldbeck's Malt Extract is a pleasant tonic. It is smooth and palatable coaxing forth the reluctant appetite. It is rich in nutritive elements, supplying t e deep foundations of perfect health

Especially useful for Nursing Mothers.

JOHN F. BETZ & SON, Limited Crown and Ca lowhill Stree s. PHILADELPHIA, PA

The Medical Department of the

UNIVERSITY OF THE SOUTH

A College Association, Graded, Gradusting Summer School of Medicine, situated on the Cum A College Association, Graded, Graduating Summer School of Medicine, situated on the Cum berland Plateau, at Sewance, Tennessee, 2000 feet above sea level, will open its intrinenthe course of lectures on April 1, 1908, and close the succeeding October Four courses of lectures will be required before graduation, with legal internals when four courses have already been taken, no internal will be required. A cool and healthful locations, good chinical and hospital facilities, adequate laboratory and anatomical equipments, with up to date opportunities for acquiring medical knowledge at reasonable charges for futution and board are some of the indiscensing inferred

For catalogues and information address,

J. S. CAIN, M.D., Dean, Sewanee, Tenn.

Dry Secretions.

Respiton COMPELS the ELIMINATING nrgans to go their normal duty, hence the remedy for Fevers, Colds, Bronchitis. Pneumonia and all Pathological Conditions with dry skin and dry secretions.

Respiton represents the medical properties of Asciepias and

Berberis. Dose, teaspoonful every two nr three hours, or less often, as Indicated

Dad Chemical Company, . . New York and Paris,

OROCIDE

A Harmless General Antiseptic and Germicide

ALKALINE

NON-TOXIC

FORMULA:—MENTHOL, THYMOL, EUCALYPTOL, FORMALDEHYDE, SODA BICARBONATE, OIL OF WINTERGREEN, OIL OF PEPPERMINT, MAGNESIA CARBONATE.

The value of an antiseptic is estimated by its power to destroy the most virulent bacteria. OROCIDE is a valuable antiseptic solution in the treatment of wounds, ulcers, and as a mouth wash, etc. Bacteriological tests show that:

A 50% solution of Orocide is a perfect bactericide.

A 10% solution of Orocide inhibits the growth of Pathogenic bacteria.

A 2% solution of Orocide inhibits the growth of Pathogenic bacteria for 24 hours.

A 15% solution of Orocide is a bactericide for Pathogenic germs.

A 25% solution of Orocide is equal to a 4% solution of Formaldehyde in preventing the development of Infusoria.

A 25% solution of Orocide is equal to a 4% solution of Formaldehyde in arresting the development of Infusoria.

Send for "Experimental Test" Circular

OROCIDE COMPANY

728 Sansom Street

d

Philadelphia

Also makers of The College Tooth Paste



Direct to the Gates

of the

Portland Exposition

June 1 - October 15, 1905

Yellowstone Park and its magnificent Grand Canyon, the springs, geysers, petrified forests, amazing natural phenomena en route at small cost. Only a short trip to Alaska. Very low rates. Comfort via

"North Coast Limited"

Northern Pacific Railway

Booklets—Four cents for "Lewis and Clark Booklet'A," six cents for "Wonderland," to A. M. Cleland, G.P.A., St. Paul. Information—Address C. A. Matthews, G.A.P.D., 208 So. Clark St., Chicago.

Two transcontinental trains daily between St. Paul and Minneapolis, and Portland, Tacoma, and Seattle. Through Northern Pacific-Burlington service between St. Louis and Kansas City, and Portland, via Billings.



SARAH LEIGH HOSPITAL NORFOLK, VA.

A new, thoroughly up to date private hospital Rooms single or en suite Private Baths Quiet surroundings Salubrious Climate Especially for Surgical, Gynecological and Rest Cure Cases A few Medical cases taken

Correspondence with physicians invited Address one of the following

DR SOUTHGATE LEIGH, BURGEON IN CHARGE DR STANLEY H GRAVES, ASSOCIATE MISS M A NEWTON, SUPER NECESSET

Further Important Facts

777

The practice of substituting woot at cohal for grain alcohal in the manufac threof medicinal preparations it is most insideous and peralectors means of poisoning, and the sale of rea edice and tolet preparations manufactured with wood alcohal hould be restricted by Pharmacy — Bulletin of Pharmacy

1980 I Alkan

GENITO-URINARY IRRIGATION BASIN

DESIGNED BY DR J & CARNETT, PHILA., PA

Price, \$7.00 each

THE VALZAHN CO.

PHILADELPHIA SURGICAL INSTRUMENT HDUSE

132 South Eleventh Street PHILADELPHIA, PA

FOR MALE PATIENTS

This basin is constructed of nickel-plated copper and readily contains two quarts of solution.

Its shape is shown by the illustration.

It is so constructed as to rest

rest across the front of the thighs

It is designed especially for office work of the physician and for those cases in which the patient himself carries out a prolonged course of irrigation.



An antiseptic in surgery, that destroys and prevents the growth of bacteria, is

Phénol Sodique

—antiseptic, hemostatic, prophylactic, and anodyne surgical dressing for cuts, burns, sores, bruises, and inflammation.

May save operations by prescribing

"SOLULES"

Ergaloids

for Amenorrhea, Dysmenorrhea, and irregular menstruation. Happy and pleasant combination. Easy to take.

Samples and literature upon request. Mention this Journal,

HANCE BROTHERS @ WHITE

PHARMACEUTICAL CHEMISTS

Philadelphia

New York

Chicago

NORTHWEST MEDICINE

An Ethical Monthly Medical Journal owned and controlled by the Medical Profession of the Northwest.

It publishes selected Original articles, Reports of the Local Societies, Editorials, Abstracts and Book Reviews.

Its object is to gather and record the Medical Literature of the Northwest and to promote the welfare of the Medical Profession.

Subscription \$2.50 per annum.

Splendid medium for advertisers. Rates on application. Send for sample copies. Address

NORTHWEST MEDICINE

MARION BUILDING

SEATTLE, WASHINGTON



NORMAL DIGESTION

A large majority of all patients, in the average practice, suffer from malnutrition, and in all patients the restoration of healthful digestion is the first consideration, the point singled out for immediate attack

ment necessarily 1411s
Make it a rule to add

Pabst Extract

to your other medication lt invariably puts life into the patient, something substantial to work on, so that other medicines will give a proper reaction

Only the choicest malt and hops go into Pabst Extract, and the combination is all that science, skill, and liberal expenditure can make it.

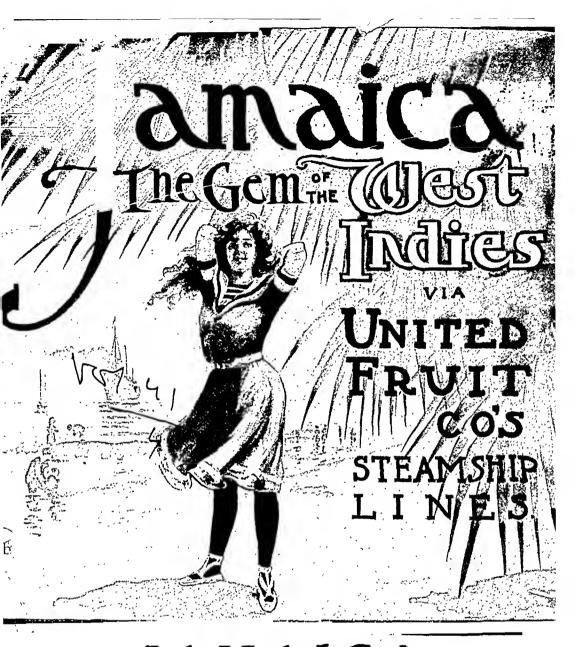
It is the best malt extract made—it is perfect,

Pabst Extract Laboratory Milwaukee, Wisconsin

When writing please mention

TVALS OF SURGERY

31



JAMAICA WHERE SUMMER IS 12 MONTHS LONG

An increasing number of tourists and health seekers who wish to escape the harsh Northern-Winter are yearly choosing Jamaica. Its gentle climate, gorgeous tropical scenery, outdoor recreations and splendid hotel accommodations offer unusual inducements to the sojourner.

Nowhere can winter be spent so delightfully

THE UNITED FRUIT COMPANY'S Steel, Twin-Screw U. S. Mail Steamships

ADMIRAL DEWEY ADMIRAL SAMPSON ADMIRAL SCHLEY ADMIRAL FARRAGUT

sail weekly from Boston and Philadelphia, Steamships BROOKLINE and BARNSTABLE weekly from Baltimore. The passage down the coast is the favorite short ocean voyage.

Round Trip Fare, \$75 {including meals} Single Fare, \$40

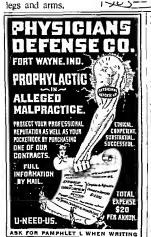
Write for Jamaica literature describing and illustrating the Island and tours of interest.

Address Division Passenger Agent,

United Fruit Company, Long Wharf, Boston; 5 North Wharves, Philadelphia; Hughes & Henry Sts., Baltimore
Raymond & Whitcomb Co.

Thos. Cook & Son, Tourist Agents





superiority

of Marks

artificial

DR. BROUGHTON'S

701

Broadway,

winzy New York.

SANITAR IUM

For the care of Oppum and other Drug Addictions, including Alcohol and Special Nervous Cases.

R. BROUGHTON, M.D.

2007 5 Main St . ROCKFORD, ILL.,

AND DIRECTORY

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

See that the name R. L. POLK & CO. IS ON THE ORDER BEFORE YOU SIGN IT.

POLK'S is the only complete Medical Directory LK'S is the only Medical Directory having an index to all physicians in the United States. DLK'S has stood the crucial test of time with

MICHIC

SURSCRIBE NOW.

The advent of the season in which

COUGH. BRONCHITIS. ASTHMA. WHOOPING COUGH. Etc.

Impose a tax upon the resources of every physician renders it opportune to re-invite attention to the fact that the remedy which invariably effects the immediate relief of these disturbances, the remedy which unbiased observers assert affords the most rational means of treatment, the remedy which bears with distinction the most exacting comparisons, the remedy which occupies the most exalted position in the esteem of discriminating therapeutists is

GLYCO-HEROIN (Smith)

GLYCO-HEROIN (Smith) is conspicuously valuable in the treatment of Pneumonia, Phthisis, and Chronic Affections of the Lungs, for the reason that it is more prompt and decided in effect than either codeine or morphine, and its prolonged use neither leaves undesirable after-effects nor begets the drug habit. It acts as a reparative in an unsurpassable manner.

DOSE.—The adult dose is one terspoonful, repeated every two hours, or at longer intervals, as the case may require

To children of so or more years, give from a quarter to a half teaspoonful.

To children of three or more years, give five toten drops.

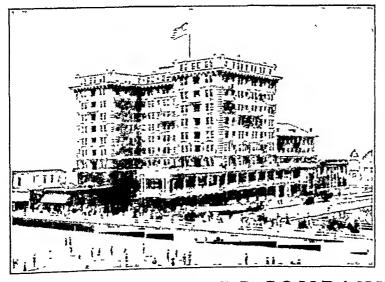
MARTIN H. SMITH CO. PROPRIETORS.

New York, N. Y.

Samples sufficed, carriage find, upon request

CHALFO

ATLANTIC CITY. NEW JERSEY



This new Fireproof Structure was opened July 2, 1904, after the expenditure of over \$600,000.00 for improvements.

Special provision has been made in it for those seeking rest and recuperation at the seashore. It is different in many respects from other resort houses, but especially so in the increased amount of space devoted to the public and the variety and excel-lence of the table.

The patronage and favorable influence of the Medical Profession is solicited.

CHALFONTE Is Always Open.

LEEDS COMPANY THE

ON THE BEACH Atlantic City, N. J

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic,
Antiseptic and Styptic. The application of
Orthoform to wounds of whatever character
relieves pain for hours, frequently days. Also
itching and pain of Pruritis, Eczema, Laryngeal
Tuberculosis, Otitis, Conjunctivitis, etc.
Used as sprinkling Powder, Insufflation, Emulsion
or Ointment.

Literature on application to

VICTOR KOECHL @ CO.



Wearers of ordinary underclothing cannot appreciate what real summer comfort means until they try this cool, porous, ventilating Linen Underwear. No other is like it—no other can give the same comfort and satisfaction.

For Booklet Samples and Full Information Address

THE DEIMEL LINEN-MESH COMPANY 491 BROADWAY, NEW YORK

SAN FRANCI-CO WASHINGTON, BROOKLYA BALTIMORE MONTREAL, 111 Montgomery St. 1313 F St. N.W. 510 Fullon St. 1307 C Charles St. 202 St. Catherine St. LOTHON SI Stand (Totel Ceell)

Dr Delmei Linen Wesh Supporters, Suspensories, etc. are made and sold exclusively by J FLLWOOD LEF CO., Conshohocken, Pa

Cheer thy Spirit with this Comfort

DR. CALEB LYON an old Bellevue practitioner sends us the following:

"I reiterate my assertion regarding Antikamnia & Codeine Tablets, made nearly a year ago, and am daily prescribing them with happiest effects,

"In my practice they accompany the maid from her virgin couch to her lying-in chamber, assuaging the perplexities of maidenhood and casing the trials of maternity with most gratilying results."

"I caracstly hope that the proprietors of this valuable remedial agent will keep it up to its present standard of purity and excellence."

This
is
is
just
what
we
are
doing

ANTIKAMNIA TABLETS
(Five-Grain Only)

ANTIKAMNIA & CODE INE TABLETS
(#2/ gr. Antikamnia, 1/4 gr. Sulph. Codeine)

ANTIKAMNIA & HEROIN TABLETS
(5 gr. Antikamnia, 1/2 gr. Heroin Hydrochior.)

ANTIKAMNIA & GUININE TABLETS
(21/2 gr. Antikamnia, 2/2 gr. Bisulph, Quínine)

ANTIKAMNIA & SALOL TABLETS
(21/2 gr. Antikamnia, 2/2 gr. Saloi)

ANTIKAMNIA, QUIN. & SALOL TABLETS
(2gr. Antikamn. 2 gr. Bisulph. Quín., 1 gr. Saloi)

LAXATIVE ANTIKAMNIA TABLETS
(Laxative-Analgesic-Antipyretic)

LAXATIVE ANTIKAMNIA & QUIN. TABLETS
(Tonic Laxative-Analgesic-Antipyretic)

ANTIKAMNIA POWDERED

The Antikamnia Chrunial Contary

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in comfort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

COLLARGOLUM

UNGUENTUM CREDÉ

ful weapons even in desperate infecNoames)
recorded in a literature of over 150 reports shows
their efficacy and harmlessness

CREOSOTAL-HEYDEN DUOTAL-HEYDEN

Bland carbonates of the caustic creosote and guaiacol. Even 1½-dram doses are well borne. Hundreds of

check beginning sepses and are power-

publications evidence their value in phthisis, pneumonia, typhoid fever, bronchitis, etc.

ORPHOL (Betanaphtol Bismuth-Heyden)

The astringent antiseptic par excellence in all enteric fermentative processes. Innocuous, inodorous, tasteless.

It rapidly eliminates the toxalbumins and soothes inflamed mucous membranes.

Literature supplied by

SCHERING & GLATZ, New York.

CHICAGO ROENTGEN X-RAY

LABORATORY

6000 Skiagraphs taken within past air years

SEND for book containing Skupriphs of Tomor Cyrix. Read blood Clots in the Brain, Read Clots in the Brain, Read Clots in the Brain, Read Clots in the Brain, Call, Diseases of Lange, Cart to the Heart, Assentian, Pencata of the Heart, Assentians, Pencata with effusion, Floating Kidneys, Tumors, Eone Duesses, Fractures, Dislocations, also Deformates of the Hip, Sput and other parts of the body

Established May, 1896 for Medical Diagnosis

W. C. FUCHS 406-407-408 Schiller Bidg.

103-109 Randolph St. CHICAGO

Telephone Central 1155

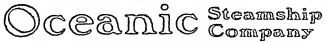


Fracture of the ries of the Acetabahum in a physician Differential diagnosts of this fracture from a fracture of the seck of the femor made by the Y Pane.





A LAND of astounding contrasts in both scenery and inhabitants. Where, within a day's journey of each other, are the sombre grandeur of Norwegian fjords and peaceful beauty of the Irishlakes. Volcanoes in eruption, glaciers and geysers. Mountain scenery unsurpassed by Switzerland. The land of the Maoris where civilization and savagery touch elbows as nowhere else on earth. The one corner of creation which should not be left unvisited.



American and Australian Line

Offers a luxurious passenger service between San Iraneiseo, Hawaii, Samoa, Tahiti, New Zealand and Australia. Around the World. Send 15 eents postage for handsome New Zealand book. Illustrated folder free,

J. D. SPRECKELS @ BROTHERS CO., General Agents, 643 Market Street, San Francisco

B. R. DENBIGH, General Eastern Agent,

427 Broadway, N. Y.

Nature's method of providing against the admission of septic matter is by plastic infiltration, then follows an

Effort to wash out the offending matter by an exudation of serum

To obstruct this wise system by the use of escharotic antiseptics, acts to

Produce conditions which have the effect of

delaying Resolu-

tion

Glyco-Thymoline Aids nature in her pro

Ads nature in her process of repair maintaining
the fibrin in soluble form stimu
lating capillary carulation fostering
and sustaining cell growth resulting in
the rapid formation of healthy granulations.
A practical dressing for all wounds burns,

SAMPLES AND LITERATURE IF YOU MENTION THIS IOURNAL

KRESS & OWEN CO.

and olcerated conditions

210 Fulton Street

New York

INDIGESTION

In those cases of INDIGESTION in which there is fermentation of the contents of the alimentary canal with pan sense of fulness borborigm and eructations there is no remedy

EUSOMA is an ethical non-secret preparalion and contains in each fluid dram. Echinacea Angustifolia 15 grains. Thora Occdentalis 2 grains and Baytisia Tinctoria 4 grains. It was perfect non-postonous autoseptic and alteralises for both external and internal use.

All septic conditions are promptly and favor ably influenced by the internal administration of EUSOMA which has well been termed the great corrector of blood dyscrasia

Write for sample as I booklet

666 Eusoma Pharmaceutical Co. CINCINNATI, OHIO U. S. A.

FLAVELL'S SUPERIOR APPLIANCES ELASTIC TRUSSES

CAN BE WORN DAY AND NIGHT ARE OFFARED TO PHYSICIANS AT NET PRICES



3 00

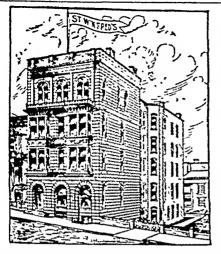
Procumatic Pads C Silk 4 00 Give circumference of abdomen on line of Rupture State if for Right or Left

ELASTIC STOCKINGS Give exact Circumference and

Net Price to Physicians StourSilk Fine Silk Thread each each A to E \$2 50 \$2 00 \$1 50 A to G 4 25 3 50 2 50 A to I 6 00 5 00 4 50 CtoE 1 25 1 50 1 00 E to G 1 50 1 25 1 00 A to C 1 50 1 25 1 00 Goods sent by mail upon receipt of price Safe delivery guaranteed RELIABLE GOODS ONLY

G. W. Flavell & Bro. 1005 Spring Garden St . Philadelphia Pa

When writing please mention Annals or Surgery



St. Winifred's Hospital, 1025 Sutter Street,

SAN FRANCISCO, CALIFORNIA. A New FIRE-PROOF Hospital

with Fifty Sunny Rooms. Centrally The most Modern Operating located. Rooms in the West. A Private Sanatorium for Medical and Surgical Cases.

WINSLOW ANDERSON, M.D., M.R.C.P. Lond., elc., Medical Olrector.



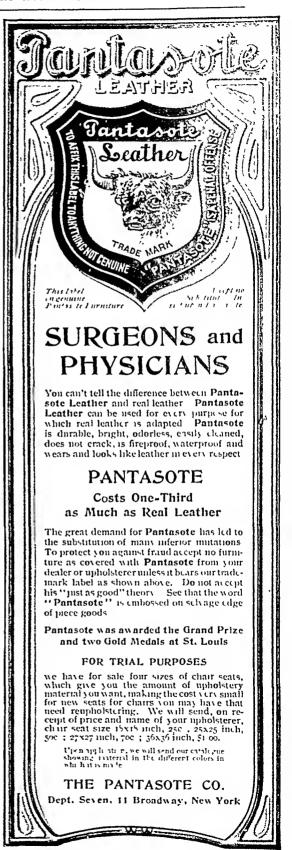
"Colorado Short Line," ...DIRECT TO...

Glenwood Springs, Colorado Springs, Manifou

Famous Resorts & Rockies.

Elegant Pullman Steeping Cars, Observation Parlor Cafe Dining Cars, with Electric Lights and Fans, and Free Reclining Chair Cars.

W. E. HOYT, G. E. P. Agt., 335 Broadway, N.Y.



Kutnow's EFFERVESCENT Powder

"The Practitioner," England, says :--

MARCH, 1904

"This preparation possesses a pleasant taste...
It is a very pleasant form of lazative medicane, acting, if taken in hot water before breakfast, on an empty stomach, in the space of about one hour Kutnow's Powder will be found most useful by sufferers from hemorrhoids, as it is gentle in its effects, while relieving the loaded portal system by its hydragogue action"

ENDORSED BY

Especially valuable for Surgeons after operations, to overcome the nausea after the anesthesia and to coax the peristaltic action



Removes Constipation, Indigestion, Bilhousness and is most useful in all derangements of the Stomach, Liver, and Kldneys.

THE LATE
LAWSON TAIT

SAMPLES SENT FREE TO PHYSICIANS

	A FREE TRIAL	
	A FREE TRIAL	
	To any Member of the Medical Profession	
Nam	E	
	E	

Kutnow Bros., Ltd.,

853 Broadway, New York, U. S. A. 41 Farringdon Road, London, Eng.

BOOKS FOR SURGEONS

BERRY.—A Manual of Surgical Diagnosis. By James Berry, M.B., B.S., F.R.C.S. 12mo; 363 pages. Cloth, \$2.00 net.

The Thyroid Gland; Its Diseases and Their Treatment. By JAMES BERRY, M.B., B.S., F.R.C.S. 121 Illustrations, from Original Photographs of Cases. Cloth, \$4 00 net.

- BURRELL AND BLAKE—Case Teaching in Surgery. Containing complete clinical histories and physical examinations of 75 actual eases, serving as a basis for exercises in diagnosis, prognosis, and treatment. By HERBERT L. BURRELL, M.D., and JOHN BAPST BLAKI, M.D. 12mo. Cloth, \$.75 net.
- BUTLIN.—The Operative Surgery of Malignant Diseases. By HENRY T. BUTLIN, F.R.C.S. Second Edition, Revised and Rewritten. Illustrated. Octavo. Cloth, \$4.50 net.
- Deaver.—Surgical Anatomy. A Treatise on Human Anatomy in its Application to the Practice of Medicine and Surgery. By John B. Deaver, M. D. With 499 very handsome Full-page Illustrations, engraved from original drawings, made by special artists, from dissections prepared for the purpose in the dissecting-rooms of the University of Pennsylvania. Three large volumes. Royal Square Octavo. Sold by Subscription, complete sets only. Half Moroeco or Sheep, \$30.00; Half Russia, \$33.00 net.

Surgical Anatomy of the Head and Neck. By JOHN B. DLAVER, M.D. With 177 Full-page Plates, nearly all of which have been drawn from Special Dissections. One Royal Square Octavo volume. Half Moroeco, \$12.00 nct.

- Douglas.—Surgical Diseases of the Abdomen. With Special Reference to Diagnosis By RICHARD DOUGLAS, M.D. 20 Full-page Plates. Octavo; 833 pages. Cloth, \$7.00; Sheep, \$8.00 net.
- JACOBSON.—The Operations of Surgery. By W. H. A. JACOBSON, F.R.C.S., and F. J. STEWARD, F.R.C.S. Fourth Edition, Revised and Enlarged. 550 Illustrations. Two volumes. Octavo. 1524 pages. Cloth, \$10.00; Leather, \$12.00 net.
- KEAY.—Gall-Stones: Their Medical Treatment. By J. H. KEAY, M.A., M.D. 12mo. Cloth, S1.25 net.
- Kehr.—Diagnosis of Gall-Stone Disease. Including 100 Clinical and Operative Cases illustrating Diagnostic Points of the Different Forms of the Disease. By Prof. Dr. Hans Kehr, of Halberstadt. Authorized translation by William Wolkins Stymour, A.B., M.D. 12mo; 370 pages. Cloth, S2.50 net.
- LEES.—Acute Visceral Inflammations: Their Treatment. By D. B LEES, M.A., M.D., F.R.C.P. 12mo. Cloth, \$1.50 net.
- MAYLARD.—The Surgery of the Alimentary Canal. By ALPRED ERREST MAYLARD, M.B., B.S. Second Edition. 97 Illustrations. Octavo. Cloth, \$3.00 net.
- MORRIS.—Textbook of Anatomy. A Complete Textbook. Edited by HENRY MORRIS, F.R.C.S. Third Edition, Revised and Improved. One handsome octave volume, with 846 Illustrations, of which 267 are printed in colors. Thumb Index and Colored Illustrations in all copies. Cloth, \$6.00; Leather, \$7.00 net.
- Moullin.—Enlargement of the Prostate: Its Treatment and Radical Cure. By C. W. Mansell Moullin, M.A., M.D., F.R.C.S. Illustrated. Third Edition, Enlarged. Octavo. Cloth, S1.75 net.
- ROLLESTON.—Clinical Lectures and Essays on Abdominal and Other Subjects. By H. D. ROLLESTON, M.A., M.D., F.R.C.P. Oetavo. Cloth, \$1.50 net.
- VOSWINKEL.—Surgical Nursing. By BERTHA M. VOSWINKEL. Second Edition, Revised and Enlarged. 111 Illustrations. 12mo. Cloth, \$1.00 net.
- WAISHAM.—Surgery: Its Theory and Practice. By WM. J. WAISHAM, M.D., F.R.C.S. Sth Edition, Revised and Enlarged, by WALTER GEORGE SPENCER, M.B., F.R.C.S. Svo; 1227 pages. 622 Illustrations, including 20 Skiagrams. Cloth, \$4.50 net.
- WRIGHT AND PRESTON.—Handbook of Surgical Anatomy. By G. A. WRIGHT, B.A., M.B., F.R.C.S., and C. H. PRESTON, M.D., B.S., F.R.C.S., L.D.S. 12mo. Cloth, \$1.50 net.

Complete Descriptions sent Free upon Request to the Publishers.

P. BLAKISTON'S SON & COMPANY

1012 WALNUT STREET

PHILADELPHIA

Tonsillitis Scarlet Fever Diphtheria

Infection in these diseases enters through an inflamed throat. The neighboring I) riph glands guard against the passage of tox ines into the circulation. But just at this critical time they become engorged and need assistance.

ANTIPHLOGISTINE

permits of the continuous application of moist heat the physical principle of osmosis and the continuous stimulation of cutaneous reflexes all of which tend to maintain the blood and lymph circulation in the affected part and to histen the climination of toxines

The enlarged glands are depleted and the limbility to Mas touldis Middle err and Larringeal complications is lessened Puin and sense of oppression are overcome the patient experiences decided comfort and convalescence is materially histened

Directions Always heat Antiphlogistine in the crin (never on cloth) by plicing it in hot water. Do not all low water to get into the preparation. When as hot as can be borne take a suitable kinfe and sprend the Antiphlogistine as quickly as possible on the skin from ear to ear at least an eighth of an inch thick. Cover with a liberal supply of absorbent cotton and hold in place with a suitable compress. Change the dressing every 12 hours.

The seamless art tight original containers of Antiphlogistine not only insure its delivery in perfect condition but are economical for the patient therefore always order an original package and specify the size required—Small Medium Large or Hospital size.

(Never sold in bulk)

The Denver Chemical Mfg. Co., New York.

STOVAINE

A LOCAL ANESTHETIC

Possessing the Analgesic Properties of Cocaine, without Harmful or Objectionable Features.

It is a Definite Crystalline Chemical Compound, Soluble in Water, the Solution being Permanent and Capable of Sterilization at 240° F.

PROF. CHAPUT, of PARIS, says:

"STOVAINE considerably ameliorates lumbar anesthesia, and lessens the chances of syncope. It also permits the undertaking of all classes of laparatomic operations, and aiding to a rapid recovery."

SOLD ONLY IN ORIGINAL PACKAGES.

Send for Clinical and Chemical Literature.

WALTER F. SYKES & CO.

SOLE UNITED STATES AGENTS
85 WATER STREET, NEW YORK

132 Chestnut St. Philadelphia. R. R. Street & Co. Chicago.

396 Atlantic Ave. Boston.

The MIDLAND ROUTE



--- BETWEEN ---

Denver, Cripple Creek,

Leadville, Glenwood,

and Salt Lake City is

THE PEER OF SCENIC ROADS
BEST EQUIPMENT—FINEST ROADBED

P. S.—Send for illustrated booklet on Colorado as a health and pleasure resort to
C. H. SPEERS, Gen. Pass. Agt., DENVER.



The Winkley Artificial Limb Co.

(Incorporated under the Laws of the State of Minnesota.)

JEPSON BROS., Sole Owners.

LARGEST MANUFACTORY OF ARTIFICIAL LEGS IN THE WORLO.

MANUFACTURERS OF THE

LATEST IMPROVED, PATENT ADJUST-ABLE, DOUBLE SLIP SOCKET

Artificial Leg

(Warranted NOT to Chafe the Stump.)

With SPONGE RUBBER, Mexican Felt or English Willow FOOT.

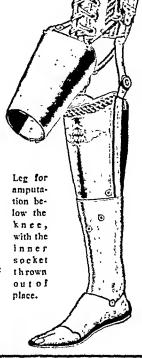
PERFECT FIT GUARANTEED

From Casts and Measurements WITHOUT Leaving Home

Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN.

U. S. A.



IT IS RARE

to find any case of nervous exhaustion, malnutrition or anæmia, that will not respond to the use of

GRAY'S Glycerine TONIC Comp.

Immediate improvement with ultimate restoration is the usual result.

THE PURDUE FREDERICK CO.,

298 Broadway, New York

Annals of Surgery

Vol XLI

MAY, 7905

No 5

ORIGINAL MEMOIRS.

ACTINOMYCOSIS 5

BY ARTHUR DEAN BEVAN, MD.

OF CHICAGO

Professor of Surgery Rush Med cal College affil ated with the University of Chicago Surgeon Presbyterian Hospital

THE purpose of this paper and demonstration is to present the clinical side of the disease, actinomycosis, as it occurs in man, and as illustrated by six cases which I have recently had under observation

I desire at the outset to disclaim any pretensions to an exhaustive knowledge of this subject from a pathological and biological stand point, and present this work as illustrative of the working knowledge, or at least part of the working knowledge, which the surgeon should possess to enable him to successfully recognize and treat these cases occurring in his actual practice

HISTORICAL

Langenbeck first noted the sulphur grain like bodies of actinomy costs in an abscess, in 1845, he did not recognize their true nature

Bollinger, in 1877, recognized the vegetable organism of ray fungus as the cause of lumpy jaw in cattle

¹ Read before the Chicago Surgical Society, December 5 1904.

Israel, in 1878, recognized the ray fungus as the cause of disease in man.

Belfield first recognized the ray fungus in this country in lumpy jaw in cattle, and Murphy reported the first case of actinomycosis in man in this country.

The ray fungus is difficult to classify, and its classification has been a matter of much dispute. Hektoen believes that it belongs either to the simple moulds or constitutes a distinct group between moulds and bacteria.

The ray fungi are common in nature, being found in air, water, and soil, and especially as a rust on various grains and grasses. A great many varieties have been isolated, some simply saprophytic and harmless, others pathogenic. Of the pathogenic forms, two interest the clinician,—the actinomycosis generally recognized as such, and the altered form, which produces Madura foot.

The ray fungus develops from a small, round spore into cylindrical threads, which branch and form a net-work. Each single thread, with its branches, represents one whole single organism. The mass of considerable size which presents the picture of a central mass with radiating clubs is a colony of the organisms, or a group of colonies.

The ray fungus gains access to the body either through the mouth or pharynx mucosa, the respiratory tract, the alimentary tract, or the skin. Probably a lesion of the protecting epithelium must exist through which the fungus can enter, or the fungus is carried into the tissues by some foreign body, as a bit of straw or grass, or splinter of wood, or, as in one case of Madura foot, by a prong of a pitch-fork. The fungus produces granulomatous swellings in the tissues, accompanied sooner or later by suppuration and usually with mixed infection. The fungus is found in the pus, either as the ray fungus colonies or granules, which can be seen with the naked eye, or as the thread-like bodies of the single organisms to be seen on staining. In the granulation tissue the same forms can be found, but more sparingly.

The diagnosis of the lesion must be made absolute by the

finding under the microscope of the typical pictures of ray fungus colonies or threads, either in the pus or the granulation inssue. It is sometimes very difficult to do this, and a fairly satisfactory clinical diagnosis can be made from the history of the process, more or less chronic, the granulation tissue, the suppuration, and the presence in the pus and tissues of the so called sulphur grain bodies, or, as I think they should better be described, as very minute fish egg-like bodies—gray or translucent in appearance. In my cases I have found the actinomycotic granules gray or translucent much oftener than sulphur or yellow in color.

In this connection I want to call attention to one source of error which we have recently met with Last week a case of an extensive ulcerative and suppurative lesion of the jaw and cheek was presented in my chinic for diagnosis. It was very suggestive of actinomycosis. I at once carefully examined the pus macroscopically, and found many bodies identical in size and shape and consistency with the granules found in actinomycotic pus. This seemed to make the diagnosis almost certain. However, an examination of a piece of tissue showed that it was an epithelioma with pus infection, and that these suspicious bodies were epithelial pearls which, with the breaking down of the infected neoplasm, were freed and floated away in the pus. Another source of error is the finding of vegetable organisms in the saliva or pus about a mouth lesion, or in faccal matter in an abdominal lesion, suggestive of actinomycosis, but in reality a mere accidental finding, with no relation to the disease.

The pus of actinomycosis has a distinctive odor, which certainly can sometimes be detected by an acute olfactory sense. It is said to be an earthy smell, similar to that found coming from freshly turned over soil. Two of my force at the Presbyterian Hospital have distinctly recognized this odor in two cases, and suggested a diagnosis from it. In another case, where an abscess from an appendix or excal actinomycosis broke into the vagina, the mother of the patient recognized and described this peculiar odor.

In clinical work the crushing of one of the granules with a cover-glass and inspection with a four eyepiece, and first with a three, and then a seven objective, without any staining often gives a satisfactory picture and a definite diagnosis, from the finding of the ray arrangement with clubs or fragments with threads and coccus-like bodies.

We have learned, however, not to expect to find the beautiful and clear radiating clubs pictured, especially from cases of bovine actinomycosis. Instead of this, the picture is rather blurred; often the organisms have undergone some degenerative process, which leaves nothing distinctive, and it may be necessary to search for a very considerable period before a sufficiently characteristic body is formed. I am rather led to believe that the fact just cited, i.e., the difficulty of finding a clear, distinct picture of the fungus under the microscope, has frequently been the cause of error in diagnosis, and responsible for failures to recognize the lesion, when, in fact, it was present and typical. As an instance, I will say that an exceptionally well qualified diagnostician was given some pus from one of our cases, a case of lung actinomycosis. There were present many of the granules. After working over it for two hours, he reported that it was not actinomycosis, as far as he could determine, although both before and after the examination we found typical ray fungi in the pus from the same source. With the clinical picture typical, the diagnosis can be made from the thread-like forms. Cultures can be made on glycerin-agar at body temperature. The stain which Baracz recommends is gentian violet (Gram). In the tissues hæmatoxylin and eosin answer very well. Care should be taken in handling this material in the laboratory, so as to avoid possible infection of the laboratory worker; although I can find no recorded instance of such a case, yet I have had a personal communication of such a case occurring in a neighboring city.

In this same connection might be mentioned the fact that there is no positive evidence of infection of the human being from eating the meat of infected cattle, or consuming the milk or milk products from infected cattle. One must not conclude, however, that this does not occur, and until we have much fuller knowledge than we possess at present the greatest possible precautions against such a contingency should be insisted upon, especially in view of the apparent great frequency of the disease in this locality at the present time. Indeed, the great number of lumpy-jawed cattle slaughtered in Chicago, and the apparently large (though not generally recognized) number of human victims from the same disease, suggest so strongly a possible connection that even in the absence of positive proof the greatest care should be exercised by the authorities to eliminate such a source of contamination.

We can well afford to take such a position in regard to lumpy jaw, in view of the fact that such a great authority as Robert Koch will not accept as a demonstrated fact the infection of a human being by bovine tuberculosis, not even in a single instance, and yet the opinion of most clinicians is overwhelmingly in favor of the probability of such a source of in fection in a large percentage of our cases

Clinically, actinomycosis appears under four different forms, from four different routes of infection

- I Head and neck actinomycosis, with infection from mouth and pharynx
 - 2 Chest actinomycosis through the respiratory tract
- 3 Abdominal actinomycosis, with infection probably always through the alimentary canal, possibly through the genital tract of the female
 - 4 Actinomycosis of the skin

The ray fungus can without much doubt gain access to the tissues through a mucosa and leave at the point of entrance little or no discernible lesion. The reported cases of primary actinomy cotic lesion of the brain, liver, spleen, etc., are probably explained in this way, that the fungus passed through the mucosa of the pharyix or middle ear in the brain cases, and through the intestinal mucosa in the abdominal cases, and developed in brain, liver or spleen distinct lesions, without any distinct lesion at point of entrance.

The lesions formed are primarily granulation tumors, or at least granulation tissue; thus, from a primary focus it extends in all directions, irrespective of tissues, by continuity. The lymphatic glands are seldom involved, that is, the fungus does not produce a lymphatic invasion; at least this is rare. We have, however, had one case of glandular involvement, and present a specimen from the inguinal glands of a fatal case of rectal actinomycosis.

Beside regional involvement, a pyæmic form is found, due to the breaking into a vein of a focus of the disease, the spores thus gaining access to the general circulation or portal circulation, and producing the picture of an actinomycotic pyæmia, with multiple foci in the lungs, liver, spleen, etc.

The frequency of occurrence of the disease in the various regions is found to be, roughly speaking, about 50 per cent. of head and neck actinomycosis, from 15 to 20 per cent. of chest cases, from 20 to 25 per cent. of abdominal cases, about 2 per cent. of skin cases, and a small balance where it is difficult to determine the route of infection.

I am satisfied that the disease is quite common, and is often not recognized. I have seen six cases recently, in little over a year; most of them were not recognized by the attending medical men, and in several instances the attendants were surgical experts. Personally, I feel that I recognized the first case of this growth rather by accident, and recognized the others because my attention had been called especially to the subject. The moral is that the attention of the profession must be called to the subject repeatedly, so that they will be always on the lookout for the disease. Certainly this is important from at least two stand-points:

- 1. If the disease is recognized, much can often be done by proper treatment.
- 2. If the disease is in fact as common as I am led to believe, a demonstration of this fact will probably lead to its more careful study, and possibly, I shall say probably, the development of a scheme of prophylaxis which will reduce the dangers from this source.

The prognosis of ray fungus disease is an interesting tonic Formerly, it was regarded as exceedingly bad. It is now known that many cases recover spontaneously, as do ordinary abscesses, either from pus infection or from tuberculosis Where the lesion is so situated that the entire focus can be safely subjected to surgical treatment, as in head and neck and skin cases, the prognosis is excellent Where this cannot be done, as in lung and extensive abdominal actinomycosis. the prognosis is exceedingly grave, but not hopeless. The treatment which was at first recommended, se, wide extirpa tion of the involved tissue, as in carcinoma, is no longer regarded as necessary The laying open of the focus or foci, the scraping away of the granulation tissue with a sharp spoon, the touching of the surface with nitrate of silver stick, the packing with iodoform gauze, the use of iodide of potash internally in good sized but not necessarily massive doses, and eventually, if necessary, the use of the X-ray, offer a plan of treatment which will succeed if the lesion is thoroughly acces-In lung cases we must be satisfied with curetting the accessible portions of the lesion in cases where the process has extended to the chest wall, and using rodide of potash and the X-ray Here the prognosis is bad, a small percentage, probably less than to per cent, being saved

In abdominal cases, where the lesion is limited and can be safely excised, as where it is limited to the appendix, excision, which offers an excellent prognosis, is in order. Some of the cases of actinomycosis of the appendix and intestine simulating appendix abseess recover with drainage of the abseess, without further treatment. Usually the case is not as fortunate, and second and third and multiple operations for opening abseesses and cureting sinuses will be necessary. Solutions, as recommended by Baracz, of 20 per cent of intrate of silver, should be carried into all the fistula and pockets, and the iodine treatment and X-ray employed. The prognosis in abdomnal cases, roughly speaking, is 70 per cent fatal and 30 per cent recoveries. The skin cases give an entirely favorable prognosis when recognized and properly treated.

The pyæmic cases are hopeless. The prognosis is undoubtedly influenced more by the resisting powers of the individual than by any other factor; certainly more by this than by any scheme of treatment. This is well shown by the cases which go on to spontaneous cure after the evacuation of an abscess without any further treatment.

Treatment, however, is of absolute and demonstrated value; and it is, I repeat, of great importance that the correct diagnosis be made, so that the patient may be given the benefit of such appropriate and valuable treatment.

Of first importance is the opening of the focus and drainage, as in any abscess. Second, removal by a sharp spoon of the granulation tissue produced by the lesion. Third, the destruction of the fungi allowed to remain in the tissues by nitrate of silver in stick or solution, or by iodine. Fourth, maintenance of drainage by iodoform packing. Fifth, the use of iodide of potash either internally or as I per cent. injection into the tissue surrounding the focus, or by cataphoresis. Senn has employed it in both blastomycosis and actinomycosis. The veterinary surgeons employ iodide of potash in interrupted doses. The same plan may be used with the patient. Use the drug for a week, interrupting for three to five days. thought that better results are thus obtained on the theory that the spores are more resistant than the adult thread forms, and that the days in which the drug is not used the spores find an opportunity to develop into the adult forms, which are more easily destroyed by the action of the drug.

The X-ray seems to be of distinct value in the treatment of actinomycosis. In the treatment of blastomycosis, the combined treatment of the X-ray and iodide of potassium has proven to be of the greatest value. This clinical fact led me to do some experiments, in which I was assisted by Professor Walter S. Haines and Dr. Joseph F. Smith. The most important result which we obtained was this, that the X-ray liberated free iodine in solutions of iodide of potash, and we believed that it was fair to conclude that given a patient with a lesion of blastomycosis or actinomycosis, saturated with

iodide of potassium and exposing the lesion to the X-ray, free nascent iodine is liberated in greater amounts than without such exposure, at and about the seat of the lesion, and that the apparent striking clinical results from such combined treatment, which I call radio-chemic treatment, found at least a possible explanation

It would seem as though our knowledge of actinomycosis is at present limited. From the very considerable progress which we have made in the last few years in the way of better ing the prognosis by improved methods of treatment, we are justified in hoping that a further study of the disease may result in the discovery of knowledge which will enable us to more easily recognize the condition, and which will furnish us the means of prophylactic treatment and curative treatment, which will eradicate the trouble

Case I—H E, aged eleven years, school boy Family his tory negative Previous history Pneumona when a year and a half old Measles at two years Present trouble Four days previous to admission to hospital the patient received a blow in the abdomen. The same evening, after eating a hearty meal, he complained of pain in right abdomen and in epigastrium. Pain increased the following day, reaching its maximum the second day. There was some nausea and diarrhea. The next two days the pain gradually diminished in severity. Patient had not pre yously suffered from similar attack.

June 15, 1904 Admitted to the hospital, complaining of only shight addominal distress. Examination showed patient to be a fairly well nourished boy. Abdomen was symmetrically distended and tympanitic, except for dull area in right lower quadrant. An indefinite mass could be made out in this region, which was not very troder. No bulging felt per section. Blood count showed 62 per cent. hæmoglobin, and leucocytes 23,500. Urine showed hyaline and granular casts. Temperature, 101° F., pulse, 112, respirations, 30

June 16 Muscle-splitting incision made over swelling and pus evacuated and drainage inserted

June 17 Temperature was 101° F, and on subsequent days

gradually receded to 99° on June 21. Temperature then began a gradual ascent, and remained between 101° and 102.5° F.

White counts were as follows: June 27, 22,250; June 28, 22,800; June 29, 23,700; July 1, 23,950.

About June 28 a swelling was noticed in right hypochondriac region. This was firm and slightly tender to touch. It increased in size in next few days.

July 1. Incision was made into this mass, and thick pus evacuated, in which were noticed distinct yellow granules. Under the microscope these proved to be colonies of the ray fungus. Drainage was instituted. Temperature remained about 100° F. for next few days, and July 7 went to 103° F.

July 8. Stomach contents were noticed on dressings from upper wound. Nutrient enemata then commenced, with nothing by mouth.

July 8. Leucocytes, 20,800.

July 11. Gradual return to mouth feeding begun. X-ray treatment every second day.

July 16. Potassium iodide commenced, gr. v, t. i. d., increasing dose by one grain daily till twenty grains were reached.

July 18. Leucocytes, 13,250. Patient then went on to complete recovery, and was discharged from hospital August 10. Continued potassium iodide, grs. x, t. i. d., at home.

January 1, 1905. Patient in good condition. No evidence of actinomycosis. In December had an attack of pain and vomiting, which lasted a few hours. Patient again placed on potassium iodide.

CASE II.—V. V., aged forty years; Swiss; occupation, car repairing. Residence, Hammond, Ind. Family history negative. Previous history: Malaria twenty years ago. No venereal infection. Present trouble began three years ago, with severe pain in right lower chest. It kept him from work for about three weeks. He then considered himself well, and continued to work till two years ago, when he had a return of the trouble, and a "sore spot" was noticed near the sixth rib in the mammillary line on right side. The tenderness would nearly disappear at times, and he would be able to work. About one year ago a lump appeared on chest-wall at seat of the tenderness. This gradually increased in size until seven weeks ago, when it was opened and pus escaped. Since then there has been a continual discharge of pus.

Patient admitted to hospital August 31, 1904 Physical examination at that time showed a reddened area and discharging sinus at fifth interspace in manimillary line on right side. Dulness was present, and breath and voice sounds absent below sixth rib, behind on right, and below fifth rib anteriorly Examination otherwise negative. Pulse, 100, temperature, 98.8° F, respirations, 24.

September I Resection of sixth rib in axillary line on right side A very thick pleura was cut through and adherent lung freed by finger About one and one half ounces of pus escaped Sinus curetted Temperature following operation was 100° F, and subsequently fluctuated for several days, the highest recorded being 101° F Respirations did not go above 28 Temperature then gradually came down to normal, and has remained so except for occasional rise to 99° F and 99 2° F

September 10 Sputum was brownish yellow and contained mustard seed like granules, which, under the microscope, proved to have the typical ray fungus appearance

September 12 Bodies were again found in the sputum and

clubbed rays demonstrated under the microscope

September 13 Began potassium iodide, ten grains three times daily, increasing dose by two grains daily Discontinued September 18 on account of stomach disturbance

September 24 Potassium iodide again, taking grs v, t i d Discharged from hospital, September 26, 1904 Weight is increasing about two pounds a week under the iodide Expectoration is diminishing, still find ray fungi. Temperature now normal, except for occasional slight evening rise. Strength improved so that he has returned to work. Prognosis is, of course, very grave, as in all cases of lung actinomycosis, and yet the marked improvement in this case is encouraging.

Case III—E J G, aged thirty one years, Augusta, Ill, farmer Family history negative Previous history Pneumonia eight years ago Denies any venereal infection

Present trouble began two months ago, when patient first noticed a "kernel' in left side of neck, about one inch below in ferior maxilla and one and one half inches from median line. When first noticed, it was about the size of a hazel nut, and not painful to pressure. This gradually increased in size, and for the past month has been the seat of more or less pain. Patient has

"felt hot in face" at times, but temperature has never been taken. Has no cough. Expectorates rather frequently, and occasionally sputum is blood-streaked. Patient admits habit of chewing grain and spears of grass. Admitted to hospital December 6, 1902.

Examination.—General appearance excellent. Weight, 197 pounds. Upon left side of neck, beneath the maxilla, is a marked swelling extending from below the left ear almost to the middle line. It is hard and almost "wood-like" in density. Only slight tenderness. Overlying skin a deep red and fixed over the mass. In centre of the mass is made out a small fluctuating area. Later this was incised and a small quantity of pus escaped. Repeated examinations of this pus showed threads. No granules or radiating threads found.

Treatment.—No further operation. Hot dressings daily. X-ray treatment every second day. Potassium iodide, beginning December 12, 1902, with grs. xv, t. i. d., increasing dose one grain daily till January 2, after which grs. 1, t. i. d.

Temperature on entrance was 100° F.; pulse, 112; respirations, 24. Following incision, temperature, pulse, and respirations came down to normal. After December 23, 1902, became somewhat accelerated, and subsequently varied between 96 and 120. With light attack of tonsillitis, January 13, 1903, there was a rise of temperature to 103° F.

The area of induration gradually diminished in size and became softer, and at time of discharge from hospital, January 21, 1903, there was no longer any pus, and area had diminished to one-quarter the size at entrance.

One year later no trace of lesion remained.

CASE IV.—F. R., aged fifty years; Spirit Lake, Iowa; farmer. Family history negative. Previous history negative. Denies venereal infection.

Present trouble: In June, 1903, patient had trouble in the rectum, which he supposed was due to piles, and in August underwent an operation. At this time the doctors told him that there were ulcers in the rectum. September, 1903, an abscess formed in front of anus, and was operated upon. There was some difficulty with urination. He passed pus from rectum from time of first operation, at one time quite a large amount. Sinus remaining after opening of abscess continued to discharge until time of entrance to hospital, November 3, 1903. Examination on entrance

showed body much emaciated Perineum red and swollen Two fistulæ in front of anus leading up towards the rectum No 20 sound passed in urethra Urine negative Temperature, 101° F, pulse, 112, respirations, 28 November 4 Operation Sinuses incised upward towards

rectum Granulation tissue curetted Wounds packed with iodo

form gauze

Discharged from hospital December 22, 1903

Admitted to my service, May, 1904, with two fistulæ about rectum General health bad, weak and emacated Diagnosis at this time tuberculosis Fistulæ curetted and packed No improvement followed the operation Within a few weeks an inguinal bubo developed on the right side. This was opened, and in the pus the granules of ray fungus were seen. These were examined under the microscope, and the diagnosis confirmed. The patient was placed on todide of potash and the X-ray. No improvement followed. The disease had evidently gained uncontrollable headway, and invaded first one hip joint and then the other, then the sacrum and spinal column and spinal cord. Death from pneumonia

Case V—Young girl living in a suburb, with parents Miss A B, seen with Dr Kinght, of Waukegan, Ill Nineteen years of age Family history negative, except for the following In August, 1904, had an attack of abdominal pain, was confined to bed for several weeks Diagnosis uncertain at first, later an abscess discharged through the vagina, about a pint of pus escaped The mother of the patient stated that the pus was not ordinary yellow matter, but gray in appearance, and of the peculiar odor of decaying matter. The patient recovered from this attack, but never fully regained her health About three days before I saw the case, in November, 1904, the patient was taken with an attack of pain in the abdomen and sharp fever, as high as to4° F. The probable diagnosis of appendictis was made, and I was called upon to operate Bimanual examination through rectum and abdominal wall showed a mass in the cul de sac of Douglas. Under ether this was opened through the vagina and drained. A peculiar bloody pus, with suspicious bodies, escaped. An examination of these bodies showed ray fung. We had here probably an actinomycosis.

of the appendix or cæcum, with perforation, to deal with. The young girl has improved greatly, and is now under iodide treatment.

CASE VI.—J. H.; captain of lake vessel; thirty-five years of age. Family history negative. Previous history negative.

Present trouble began more than two years ago, with an abscess in the region of the appendix. This was opened and drained. Patient never entirely recovered his health and strength. Complained of intestinal symptoms, and later an exploratory operation was made and the peritoneal cavity was found obliterated by adhesions, and the diagnosis of tuberculosis of the peritoneum was made. Later, two large fluctuating swellings appeared in the right lumbar region. When I saw him in consultation in the spring of 1904, these had opened, and were discharging a peculiar bloody pus, which, when examined, showed the macroscopic and microscopic evidence of actinomycosis. The patient was very weak: confined to his room. I advised iodide of potash and the X-ray. The latter was carried out by Dr. J. F. Smith, who informs me that the patient has made distinct improvement under the treatment. The region involved in this case is very extensive, and the prognosis therefore grave.

CEREBRAL TUMOR.1

REPORT OF A CASE OF REMOVAL IN TWO STAGES BY THE OSTEOPLASTIC METHOD, SUBSEQUENT WIRING OF BONE FLAP, INTRODUCTION OF A GOLD PLATE.

BY JOHN E OWENS, M D.,

Attending Surgeon to St. Luke s Hospital,

A WOMAN, Miss A K, aged thirty years, was admitted to St Luke's Hospital, August 25, 1904. There had been a gradual failure of vision, the diminution being more rapid on the right side, until, at the date of admission to the hospital, she could barely distinguish light with the right eye, and could only make out shadows from large objects with the left

Nearly five years before, a hard lump, an osteoma, the size of a walnut, appeared in the right parietal region. During three years it grew to the size of the fist, and it was of this size at the time of removal by Dr. J. S. Reeve, of Appleton, Wis, about eighteen months before admission. She had been troubled more or less with sick headaches since childhood, chiefly frontal and lately occipital, and also in the former period she had rheumatism, scarlet fever, measles, and diphtheria.

In addition to the dimness of vision and headache, Miss K has noticed failing memory, numbness, with tingling beginning in the fingers of the left hand and creeping up the arm, varying as to time, but usually lasting about half an hour, vertigo and vomiting frequent, tenderness over the scar. Her appetite and sleep were unusually satisfactory, weight, 105 pounds, no gain or loss constipation, menstruation, which began at fourteen, regular, family history negative.

She went out with difficulty, and fell a number of times in consequence of defective vision and dizziness. During childhood the headaches were very severe. The vomiting sometimes lasted nearly half a day. The attacks occurred almost daily. She suffered in this way until August 24, 1904, although not so severely as in childhood.

Read before the Chicago Surgical Society, January 16 1905

Physical Examination.—(a) General. Color healthful; patient cheerful; well nourished; strength and development fair; right-hand grasp somewhat stronger than that of the left; papular eruption on chest, shoulder, and arms; shape and movements of chest normal; hallux varus on both sides.

Head. The skull is abnormally prominent at the site of the operation for the removal of the osteoma; vessels of the scalp largely dilated.

Special Examination.—(b) No deviation of tongue; pupils dilated; vision of left eye much impaired.

The following is the report of Dr. Paul Guilford's examination of the eyes:

"Tested together both pupils responded quickly and equally to light, but when left uncovered the right pupil dilated and did not respond to light. Vision of right eye was reduced to simple light perception; vision of left eye 20/50; not improved by glasses; media clear; marked choked disk of both eyes, especially of the right, where nerve had swollen eight diopters; left nerve swollen five diopters; no retinal hæmorrhage. Optic atrophy will surely follow; prognosis very bad." He did not think vision would be improved by removal of a tumor.

Touch and sensation were apparently normal; reflexes responded readily on the right side; knee, biceps and triceps reflexes exaggerated on left side; no Babinski; no ankle clonus.

The following diagnosis was arrived at: Intracranial tumor, probably an osteoma, growing from the inner surface of the skull beneath the site of that above referred to. Dr. Archibald Church saw the case in consultation, and concurred in the diagnosis of brain tumor in the location of the osteoma removed by Dr. Reeve. The operation was set for August 30, 1904.

Technique.—After a final table preparation of the head, the upper and lower extremities of the Rolandic fissure and the middle meningeal artery were located. A large horseshoe-shaped flap was outlined by incision in the parietal region on the right side, the base or pedicle looking downward, the flap being made narrower at the base for convenience of subsequent operative steps; scalp separated from the bone, leaving about one inch of bone surface exposed previous to making four small trephine openings in the skull, one on either side at the pedicle and one on either side of the upper portion of the flap, with a view of dividing the

intervening bone. The harmorrhage from the scalp was profuse and difficult to manage. In spite of the fact that the head was encircled with an elastic band, harmorrhage persisted even after a number of artery forceps had been employed. These, as well as digital compression here and there, were not sufficient to completely arrest the bleeding. In other words, the moment the pressure was relaxed the harmorrhage was renewed.

The trephining was completed, and the intervening bone, between the two upper trephined holes, divided with considerable difficulty, as the bone was half an inch thick and devoid of diploic structure, so that the division of the skull by rongeur forceps was very tedious. At this stage the patient's condition became so alarming, chefly from loss of blood, that it was thought best to abandon the operation for the time being. The wound was quickly closed by continuous suture. The prostration was extreme, and great difficulty was experienced in carrying the patient through the next twenty four hours. She had, however, so far improved that the second stage of the operation was performed on September 6.

Technique—A thorough table preparation, rubber constructors placed around the head, scalp readily pulled apart at the line of incison Bleeding numediately became very severe, but was quickly arrested by loosening the scalp at the pedicle for the pur pose of enclosing the latter in an elastic ligature. The division of the bone flap, by means of rongeur forceps, became very tedious and discouraging until, by means of a burr head drill, the skull was thinned sufficiently to allow the biting forceps to proceed more rapidly

The bone flap at the pedicle was partially divided by means of the Gigli saw having been passed beneath, and the underlying parts protected by means of F C Schaefer's Protector Moder ate force completed the division by fracture, when the osteo plastic flap was readily turned down exposing the dura There was an opening in the dura at the upper right hand segment of the exposed portion, filled with a soft tumor like substance. This opening was enlarged sufficiently to introduce two fingers, by means of which soft, light purple material was removed from a surrounding capsule. The tumor like substance was of the consistency of shad roe. Several sutures were placed in the dura and the tumor cavity packed with nodoform gauze. No effort was

made to remove the capsule. The osteoplastic flap was replaced, iodoform gauze drains brought out at dependent portions of the incision, the scalp wound sutured, constrictor removed, and large dry-dressing applied. Patient was in fairly good condition upon her return to the ward, but two hours subsequently the pulse became very feeble, almost imperceptible, and her condition in general required close attention. The next day, however, there was marked improvement.

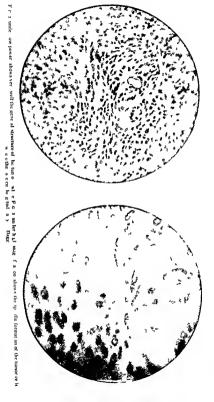
At the first dressing on the 8th there was a slight amount of purulent discharge at the lowest drain opening. September 20 all the stitches were removed. There were four points in the scalp from which there was a discharge, viz., at both lower segments of the flap, a point where the tumor was situated, and the middle of the posterior leg of the incision.

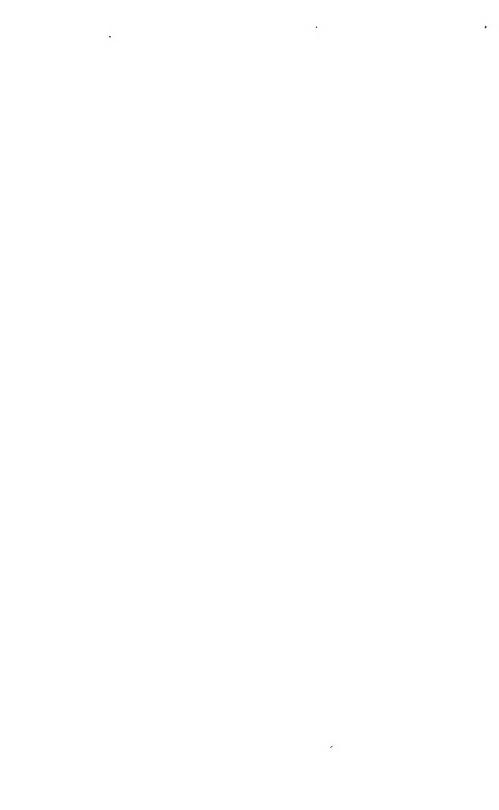
It was observed at the dressings that the osteoplastic flap was elevated one and one-half centimetres above its normal level. It was, however, easily pressed into position without resulting cerebral symptoms. A hernia cerebri had developed, but it was easily reduced, and it was thought that it could be made to disappear by means of compresses of iodoform gauze and other dressings kept in position by a strip of adhesive plaster, and over all a Martin's bandage, the latter being more particularly directed to keeping the bone-flap in position. Peroxide was directed to be used through the drainage openings beneath the scalp, followed by irrigation with normal salt solution.

We found that the elastic bandage was not borne well,—not that it produced brain symptoms, but the pressure around the jaws was distressing, and it became necessary to discontinue it.

September 26 the discharge had diminished. As there was no tendency towards bone union in the skull, and without such pressure, as the patient was unable to endure, it was impossible to prevent the reappearance of the hernia cerebri and the further elevation of the bone.

September 26 the following final operation was performed: Drilling the skull; insertion of a 22-carat thin gold plate beneath the edges of the bone and over the cerebral protrusion; silver wire introduced; flap pressed into as close apposition as possible and wire twisted; edges of scalp wound freshened with scissors; scalp sutured; dry-dressing with gauze drain.





October I there was some transient numbress in the left

October 4, interne in charge, while using peroxide along the scalp, accidentally forced some beneath the skull Immediately the patient complained of numbness in the entire left side of tongue, with severe pain in the head. The numbness disappeared in a few hours, but the headache lasted over a day

The tumor proved to be a round cell, capsulated sarcoma It spread out over the dura for a short distance, some sharp fibres from the skull running into it. The skull was hypertrophied and the diploic space obliterated. The operation was negative, as was predicted, so far as vision was concerned.

Patient stated that objects were recognized with the left eye as she formerly saw them on a very dark night, but that she could

not distinguish night from day

The histological structure of the tumor is that of a small spindle cell sarcoma (Figs 1 and 2), with a considerable amount of intercellular substance. The tumor cells seem to be arranged more or less into bundles interwoven in different directions, thereby giving a variety of form to the nucleus, depending upon whether the bundles were cut transversely, obliquely, or longitudinally. There are no giant cells to be found. Fine trabeculæ of connective tissue, which is very vascular, extend into the tumor from the periphery, and the vessel walls in this connective tissue are very well formed. But those in the tumor proper have very thin walls or none at all, in some cases showing an endothelial lining with the sarcoma cells in close contact, in others only a blood space in which not even the endothelial coat can be made out." (Dagg.)

September 23 Pathological report of a fragment of the cerebral protrusion "Fibrinous exudate unorganized, leucocytic

infiltration, infection,-diplococci"

For the first operation, August 30, chloroform was employed, and later ether was substituted, for the second, chloroform, morphine, one quarter of a grain, given hypodermically just before the administration of the anesthetic

The patient left the hospital on November 4 Nausea, vomiting, headache, and dizziness had disappeared

On December 6, 1904, Dr Reeve wrote me as follows

"I am glad to tell you that the patient seems to be doing

well. Silver wire was removed without difficulty two weeks ago. There is a small bit of bare bone visible at present. This is disappearing, and the wound requires dressing only every four or five days. Vision not changed; arm and leg are no worse; condition excellent; no temperature or cedema; appetite good; patient looks well; no portion of the gold plate is visible."

I have received two letters from the patient, the last one written December 10, 1904. She stated that the head did not pain, but sometimes there was a momentary throbbing. She further informed me that her appetite was good and she slept very well. The arm and leg had not troubled her since the headaches and vomiting ceased. There was no change in the vision, but artificial light was somewhat annoying.

RETROSTERNAL ACCESSORY THYROID TUMOR

REPORT OF A CASE REQUIRING REMOVAL TERMINATING FATALLY

BY HOWARD D COLLINS, MD,

OF NEW YORK,

Ass stant Surgeon to the C ty Hosp tal

The anatomical range in which it is possible to encounter an accessory thyroid gland is large, extending from the base of the tongue to the arch of the aorta in a vertical direction, with the great vessels of the neck forming the lateral boun daries, posteriorly the area is limited by the spinal column while in front the glands may be subcutaneously. They have also been found within the trachea and larynx

In size the accessory glands may vary from a tiny nodule to a structure as large or larger than the typical thyroid. The shape usually depends on the yielding of the surrounding tissues during the development of the gland.

Accessory thyroids have been divided anatomically into true and false. The latter are merely outbuddings of the parent typical thyroid and remain attached to it by a pedicle of true thyroid tissue. The variety designated as true accessory thyroids is further subdivided into attached and free. The free are, as the name implies perfectly distinct islands of thyroid tissue as opposed to the attached, where a strain of connective tissue binds the accessory structure to the typical thyroid body. Accessory thyroids, both true and false, may be multiple

Accessory thyroids, both true and false, may be multiple or single. When present accessory thyroids are subject to about the same pathological changes and in about the same proportion as the typical thyroid body,—a parenchymatous enlargement with colloid degeneration being the most common. Where the accessory thyroids are situated superficially and the structure is sufficiently large to admit of palpation, their presence may be appreciated, although, unless pathological changes occur, there are, as a rule no symptoms. If

the bodies be placed behind the sternum or masked by the larger structures of the neck, both the subject and the surgeon are probably in ignorance of the presence of any abnormal structure. Enlargement with pressure on the surrounding structures are usually the first signs to arouse our suspicions. The pressure symptoms vary, of course, with the structures pressed upon, and these depend on the site occupied by the tumor.

Concluding the above brief review of the subject, the writer offers the history of the following case that came under his observation.

Mrs. A., aged forty-seven years, mother of one child, presented herself to the writer on December 1, 1902. She had a globular cystic tumor about one inch in diameter to the right, but close to the median line of the neck, overlying the thyroid cartilage. Unquestionably, a cyst of the right lobe of the typical thyroid gland. The tumor had been present for nineteen years, although at first quite small; in the last two or three years there had been a decided increase in size, and lately there had been some difficulty in breathing, which the patient properly attributed to pressure on the trachea. There was no difficulty in swallowing or evidence of nerve pressure. Since girlhood the patient had been subject to bronchitis, not a winter passing-in the last thirty years without a severe attack. In other respects her history and examination were negative. Operation was decided upon and performed the following day, December 2, 1902.

Under general anæsthesia, a median two-inch vertical incision was made, with parting of the muscles down to the thyroid. The substance of the gland was divided over the eminence of the tumor and the cyst pealed out of the gland tissue. Instead of finding a simple spherical mass, the globular head of the cyst had a tail or backward prolongation about a half-inch in diameter, extending along the right side of the trachea and esophagus until only a thin layer of gland substance lay between the termination of the cyst and the muscles covering the front of the cervical vertebræ. Two small cysts about a quarter of an inch in diameter were shelled out from the left lobe of the gland. All bleeding points were then tied, the ligatures being left long; the latter

were then tied tight to one another, thus largely diminishing the size of the cavity without running the risk of renewed hæmor hage from needle puncture in attempting to diminish the cavity with sutures. A straight tract about one quarter of an inch in diameter was thus left extending from the partially sutured skin nearly to the vertebral column, into this a rubber covered gauze drain was placed. It was noted at the time of operation that the trachea at its upper end had been slightly dented on its right side by the cyst. Examination of all three cysts showed the usual colloid material

The second day after operation the patient had the symptoms of a severe attack of bronchits, with much coughing and secretion. The wound looked healthy, there had been but little hemorrhage. The drain was removed and a fresh one introduced only part way to the bottom. On the fourth day the wound was again dressed, superficial wound infection evident, and a removal of the drain was followed by some mucopurulent tenacious discharge, not the usual pus of wound infection, but more like pus mixed with colloid material. After thorough cleansing, a rubber tube was placed in the wound cavity, extending to the posterior limit. Rubber tube drainage was used instead of gauze, as the trachea seemed to have a tendency to constrict the tract, leaving an enlarged portion posteriorly.

At the end of three weeks, the bronchiths having disappeared and the sinus practically free from all active inflammation, the patient went to her home in the country and passed out of the writer's care

On December 7, 1903 one year later, she again presented herself to the narrator with the following story. After leaving New York, it had been almost impossible to keep the rubber drainage tube in situ. The tube would remain in place but a few hours, and a day or two would elapse before she presented her self to her medical adviser. A reintroduction of the tube was followed by a copious discharge of pus, and the cycle would be repeated. After a time she gave up all treatment. The sinus persisted, the discharge would be very scantly for several days, during which time she would feel ill, then a free escape of pus would occur, and she felt better for a day or two. She had lost much strength and was thin and anamic.

On examination, the local condition showed a sinus orifice

in median line one inch above episternal notch. Although this was the mouth of the old sinus, it had unquestionably been drawn downward, its change of position and the folds of skin attesting to that fact. At first a probe could be introduced only about a half-inch, but by careful exploration it was possible to map out a sinus extending backward about an inch and a half, and then taking a downward curve for about another inch, terminating in an enlarged cavity. In this cavity lay a hard substance distinctly clicking against the probe. A skiagraph was made with the full expectation of showing a small safety-pin pictured in the cavity. The skiagraph showed nothing, although the control pin placed on the surface of the neck distal from the plate was clearly portrayed. The sinus was gradually dilated with increasing sizes of rubber tubing, until a pair of specially curved forceps could be introduced, and by this means a spicule of bone-like substance about one-quarter of an inch long was withdrawn. At each subsequent examination similar pieces of material were removed, leading to the conclusion that the long-standing suppuration had resulted in a necrosis of a part of the body of a vertebra. An operation of exploration was suggested and accepted.

On March 9, 1904, under general anæsthesia, a three-inch median incision, circumventing the orifice of the sinus, was made, extending from the thyroid cartilage to the sternum. The sinus, previously distended with gauze, was then dissected out and traced backward. To the operator's surprise and mystification, the sinus, which originally had passed to the right of the trachea and esophagus, now lay to the left of those organs. The sinus terminated in a slightly enlarged cavity lying on the vertebral column at about the level of the sternal notch. Below, and apparently a continuation of the termination of the sinus, lay a discrete mass, at first thought to be enlarged lymphatic ganglia, about three inches long in a vertical direction and about an inch and a half transversely, and the same anteroposteriorly. This mass lay just to the left of the median line, terminating below behind the arch of the aorta; the trachea and cesophagus were to the right, while the left recurrent laryngeal nerve and left common carotid had been markedly displaced to the left.

The entire mass was completely and with comparative ease shelled out from the cellular tissue without any bleeding of moment. The upper part of the wound was retracted to permit an inspection of the thyroid body and the field of the former operation. The isthmus and lower margins of both lobes of the thyroid were seen and proved to be in no way connected with the mass removed. The site of the original cyst was a small scar.

The wound was then closed except at the lower part, where a large rubber covered wick was placed to the bottom of the cavity in the cellular tissue behind the arch of the aorta. The pulsations of the aorta were most markedly transmitted to the packing, the external end swaying with each beat. The usual sterile dressings finished the operation.

On gross section the mass was clearly pure thyroid tissue with many colloid cysts and numerous calcareous deposits, the sinus evidently terminating in one of the cysts that had ruptured

Microscopically the report confirmed the gross examination. The microscopic report with the anatomical observations made during the operation place the tumor in the class of true error sternal accessory thyroids. Of these tumors the writer finds only three reported (Wagner (von Bergmann)) that have undergone the pathological changes noted above, *e, colloid degeneration with calcareous deposits

For three days after the operation the patient gave every hope of a prompt recovery. The shock was slight, there was no impairment of voice or deglution. Temperature not above 100° F. The wound was aseptie, and the large cavity diminishing rapidly by the gradual return of the structures to their normal position.

On the fourth day, however, a lobar pneumonia of the right middle lobe developed, rapidly spread to the adjacent lobes, in volving the entire right lung, and eight days after operation the patient died

The writer offers this report for publication because he believes that diseased accessory thyroids demanding surgical interference are not common, and furthermore the area in volved in the surgical interference in this case is one not often invaded. At the primary operation the tract of the cyst passed unquestionably to the right of the trachea and esophagus, at the second operation the sinus lay equally clearly to the left of those structures. The writer's explanation and belief as to

this fact is that, during the slow healing at the deeper parts of the original sinus, a cyst of the accessory thyroid increased in size, passed across the trachea from the left side, and finally ruptured into the sinus. Thus, while the superficial part of the old sinus served as an outlet for both tracts, the deeper parts of the original tract healed, and the more recent channel remained open. So large an exposure of the mediastinum must predispose to pneumonia, yet, had the patient not had so marked a tendency to pulmonic disease, it would not have been unreasonable to have expected a successful outcome.

TRANSTHORACIC RESECTION OF THE LOWER END OF THE ŒSOPHAGUS IN A DOG'

UNDER NEGATIVE AIR PRESSURE IN SAUERBRUCH S BOX A PERSONAL EX PERIFNCE.

BY WILLY MEYER, MD.

OF NEW YORK.

Professor of Surpery at the New York Post Graduate Medical School and Hosp tal Attend ing Surgeon to the German Hospital Consulting Surgeon to the New York Skin and Cancer Hosp tal and to the New York Infirmary

LAST summer, when visiting the University of Breslau, on a flying trip to a number of German universities. I had the pleasure of witnessing a resection of the œsophagus just above the cardia, done by Dr Sauerbruch, one of the assistants of Professor von Mikulicz, in the well-known box constructed by him

I had read with intense interest, in the early part of the year, the publications by the Breslau Clinic regarding intrathoracic operations under negative air-pressure, as well as those emanating from Heidelberg, favoring the performance of such operations under increased air pressure, without the aid of the pneumatic box, or cabinet, which to-day, in the scientific world, bears the name of its author. F Sauerbruch

I crossed the ocean with the intention of making a thorough study of Sauerbruch's method at the place of its conception, and the pleasure that I derived therefrom is mingled with but one regret, namely, that the time at my disposal was so extremely limited

Before describing the particular operation, which forms the title of this paper, I should like to make a few general remarks regarding the origin and plan of the method

In an original communication published by Dr Sauerbruch in No 6 of the Centralbl fur Chirurgie, 1904, February 13, entitled, "On the Ways and Means of excluding the Injurious Effect of Pneumothorax in Intrathoracic Operations."

Read before the New York Surgical Society, December 14, 1904. 667

he stated that in October, 1903, he had been charged by his chief, Professor von Mikulicz, to investigate the question as to how best to prevent the occurrence of a pneumothorax in intrathoracic surgery, the main point to be considered being to render practicable transpleural resections of the œsophagus for carcinoma, a procedure which, so far, had been followed by the most disastrous results in experiments upon animals as well as in the human subject.

The inevitable occurrence of pneumothorax upon opening the thoracic cavity being the chief obstacle to our working within the same with equal freedom as we do within the abdominal cavity, the direction in which the theoretical solution of the problem lay, was clear. It was evident that such operations would have to be done either by increasing the pressure within the lungs, exposing at the same time the thoracic cavity to ordinary atmospheric pressure, or by reversing conditions, that is to say, placing the thoracic cavity under decreased or negative pressure, while the bronchial system remains exposed to normal atmospheric pressure. Whether or not this could be practically carried out, of course, could be determined by experimental research only.

The method, long employed by physiologists, of rhythmically pumping air into the lungs through a tube tied into the trachea, the only method of operating under increased pressure known up to that time, had been tried by von Mikulicz, but his experiments upon animals had not been satisfactory. He therefore resolved to try the other alternative, the ways and means of which he left to Sauerbruch to discover. Von Mikulicz's charge to Sauerbruch, therefore, was to try and find a way by which it would be possible to open the thorax with the atmospheric pressure reduced, yet enabling the surgeon to do his work.

With this object in view, Sauerbruch set to work.

He first constructed a rather primitive apparatus, consisting of a glass cylinder closed at either end by means of guttapercha paper; the latter contained three openings (one larger and two smaller ones) on one side and a larger hole on the other (Fig 1)* Through the two larger opposite holes the animal was pulled so that the head rested outside of the cylinder at one end, the hind legs and abdomen at the other, the trunk remaining within the cylinder. The necessary instruments having been placed within, Sauerbruch pushed his hands through the two smaller openings at the head end. After this all holes were closed air-bight, and air was withdrawn from



FIG. 1—Sauerbruch a original prim two apparatus, which was constructed for the sake of finding out whether the thoracic cavity of a dog could be opened b laterally with impunity by atmospheric air pressure he ug reduced.

within (by suction) through a drainage-tube, until the pressure was reduced to the desired degree. Then the thorax of the animal was opened bilaterally. The lungs did not collapse and respiration continued undisturbed. Three minutes later a rent in one of the membranous end coverings of the cylinder occurred, with the result that the lungs collapsed under the atmospheric pressure and the animal died almost instantly.

Encouraged by this experiment, Sauerbruch had another improved box constructed (Fig. 2). This was about five feet long, a little over three feet wide, and about four feet high. It was made of wood three-fourths of an inch thick, tin-lined, and covered with a glass roof. The door was not quite four feet high and two feet wide, and was hermetically closed by

^{*}The figures have been copied from Sauerbruch's and Brauer's articles repeatedly referred to

means of rubber straps. In the wall opposite the door was a hole about one and three-fourths feet in diameter, which was closed by a rubber cap with a central opening, through which the head of the animal was pushed; a rubber cuff was placed around the well-shaven neck in such a way as to avoid all ingress and egress of air. The box was large enough to hold an operating-table on which the trunk of the animal was placed,

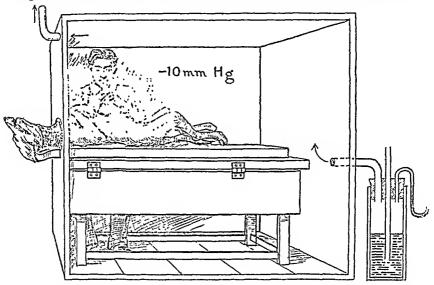


Fig. 2.—Sauerbruch's first wooden box, designed for intrathoracic operative work under negative air-pressure.

and besides furnished seating capacity on either side of the table for operator and assistant. In the upper corner of the wall which had the large opening was a smaller one, about the size of a silver quarter, which was connected with a suction-pump. In the opposite wall was one of the same size, constructed with a valve allowing the access of just sufficient fresh air to produce within the box the desired degree of underpressure. Once in every four minutes the entire air within the box was changed. Ten millimetres Hg (mercury) proved the amount of negative pressure best adapted for these operations. Two persons could well work in the box for two hours without interruption and without appreciable personal inconvenience. Of course, the temperature within always rose by several degrees, from about 68° to 73° or 74° F., and the

percentage of humidity also increased, drawbacks which were soon overcome, in part at least, by the construction of a larger box for operations on the human subject Among the opera-tions done in above described box were resections of the esophagus and of the lungs, opening of the pericardium and mediastinum The glass top, besides admitting the light, gave a welcome chance to a number of spectators to witness the interesting work done within

How far intrathoracic operations can be carried out in this way without immediately jeopardizing the life of the ani mal, is well illustrated by the following operations done on a chloroformized dog

First, a large, bilateral flap resection of the thorax was done, then esophagotomy added, and the pericardium with mediastinum opened After closure of the wounds, the animal came to and was able to run about the room. As the opera tion had to be done without aseptic precautions and suture of ribs, death ensued on the second day At the autopsy both lungs collapsed when the pleural cavities were opened, same as we are wont to see happen under normal conditions, and without showing any atelectatic portions

The cardinal question of the feasibility of such operations under negative pressure having been demonstrated a larger room one with fourteen cubic metres of air space as against two in the old box, was built at the Breslau Clinic (Fig. 3) It was arranged for operations under increased as well as negative pressure It would lead me too far to give a detailed description of it here, but those interested I would refer to Sauerbruch's extensive article in Mitteilungen aus den Grenzgebieten der Medizin und Chirurgie, Vol ain, Tome 3, entitled, "Zur Pathologie des offenen Pneumothoraa und die Grundlage meines Verfahrens zu seiner Ausschaltung"

It was in this larger box that I had the privilege, in July

last, to see Dr Sauerbruch himself, assisted by Dr Gottstein for many years assistant to the Chinic), do an operation which hitherto liad been merely a surgical dream. Five persons were in the room, which was brilliantly illuminated by a large arc lamp and a number of smaller electric lights, namely, the operator and his assistant, one person to hand him the instruments, another to communicate with the outside, if required, by means of a telephone, and do such minor detail work as might become necessary during the operation, and myself. The narcotizer, of course, remained outside, but was able, in spite of double windows and the noise produced by the air-pump, to

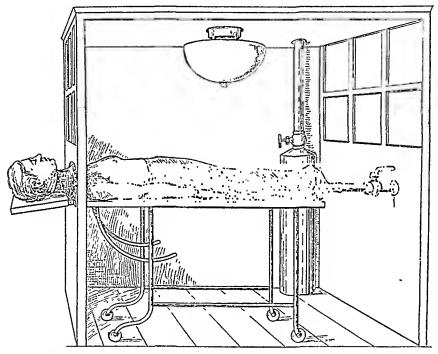


FIG. 3.—The chamber which is used at present for operations under negative air-pressure at the Breslau Clinic.* (A rubber sac, covered by canvas, surrounds the lower half of the patient's body. It connects with the outside by means of a straight tube. Thus the entire body of the patient, with the exception of the thorax and upper extremities, remains under ordinary atmospheric pressure. This arrangement maintains the normal pressure difference between the veins and the right atrium, and prevents stasis of the blood.)

hear the instructions called out by the operator. A number of interested assistants and other physicians stood outside watching the procedure. It was the hottest day of one of the hottest summers experienced in Germany within the last twenty years, and, while perspiration flowed freely, we all felt quite comfortable in this comparatively small room.

^{*}Two more instructive illustrations, showing the details of the interior of the chamber, will be found in Sauerbruch's article.

A fair sized dog, whose chest had been well shaved, was placed upon a pillow on the operating-table with the left side of his body thus pushed forward. The head and neck of the animal were outside of the box, a rubber cuff being fitted around his neck rather loosely, as it had been found unnecessary, in the course of experiments, to completely shut off the air at this point, the pressure controlling apparatus regulating matters perfectly, even if some air should enter at the head-hole, in fact, what little air could enter in this way had proven useful in helping to ventilate the cabinet Then the operation was begun under due asen tic precautions Longitudinal incision, about twelve centimetres long, in the fifth intercostal space, the various tissues being divided parallel to the ribs and the costal pleura cut down upon. No collapse of the lungs, the dog continued to breathe normally The lung which appeared to be in the way was quickly pushed aside and the œsophagus attacked it was grasped with the left thumb and forefinger and pulled forward The nervus vagus on either side was pushed back with forceps, they do not appear again during the operation The foramen cesophageum of the dia phragm is entered into with the finger and bluntly torn, sufficiently far, to permit of pulling the cardia and adjoining parts of the stomach into the thorax All this is easily and quickly done under full view of the spectators Although both pleural cavities had now been opened and were widely gaping, breathing con tinued undisturbed as before Aseptic gauze tamponade to all sides The cesophagus, after being clamped above and below the division line, is cut half way around only, in order to enable the operator to first catch the mucous membrane with small forceps. as it has a great tendency to retract After this, total division Then threefold purse string suture with silk,* one above the other, the wall of the stomach being deeply grasped, inversion of cardia (supposed to be the seat of carcinoma) into the stomach, in this way shutting it off from circulation. This manoriver is assisted by two forceps pushing the cardia inward. A few additional interrupted sutures secure the inversion. Thus the portion of the cesophagus near the cardia, being the seat of a carcinoma, is not cut out, but left in place, and shut off from circu lation by inversion into the gastric cavity. Such an inverted

^{*} Silk was used throughout the operation.

portion of cardia, as Dr. Sauerbruch told me, had later at the autopsy often been found as a totally necrosed part within the stomach.

Then the posterior wall of the stomach was caught with two forceps, put on the stretch, and stitched to the posterior circumference of the œsophagus with interrupted silk sutures, same as is done in gastro-enterostomy with needle and thread. Thereupon the stomach was opened and united with the œsophagus by interrupted (silk) sutures, embracing the entire thickness of both organs. As much as possible of the anterior aspect is pulled to either side of the sutures in order to leave the smallest possible distance to close at the anterior circumference. Before this latter step had been accomplished, the animal vomited, flooding the operating field with stomach contents mixed with some blood: Fortunately, the greater part of this fluid was caught by the tampons. All having been carefully mopped away, the operation was again proceeded with. A few additional sutures were placed so as to pull the stomach over the œsophagus, and at last two stitches, one on either side, suspend the stomach in such a way that the original anastomosis is literally surrounded by the stomach wall. Finally, the wounds in the diaphragm and the peritoneum were closed around the esophagus by stitching the same to the latter above the field of anastomosis without perforating the œsophagus, of course. In this way the entire place of anastomosis is buried within the peritoneal cavity. Irrigation with saline solution, generally employed by von Mikulicz at this stage of the operation, was omitted in this instance. Thereupon removal of the tampons and stitching of lower cut surface of the intercostal muscles to that of the upper one, including the superficial thoracic muscles, with interrupted sutures, about one-half inch apart, by which means the superficial muscles were partially inverted. Sufficient space remains between these sutures to see the lung beneath them. Then an increased working of the suctionpump was ordered, to produce greater negative pressure. This expands the lungs so that they lie close to the costal pleura again; now a second continuous muscular suture is put in, which hermetically seals the thoracic cavity. After this, fresh air is allowed to enter the box, and the skin wound is closed by a continuous suture and covered with iodoform collodion. The dog's pulse was good at the completion of the operation.

Through the courtesy of Dr Sauerbruch I can add the following postoperative history of the dog operated upon The animal did well during the first days following the operation On the sixth day, dyspinos, vointing, rise of temperature set in, with dulness over the left pleural cavity Diagnosis empyema Reopening of the wound gave exit to a large amount of pus Drainage The animal gradually recuperated Four weeks later some stomach contents escaped out of a channel fourteen centimetres long, which latter, after two weeks, closed spontaneously

It was evident, Sauerbruch states, that the suture did not close water tight, a difficulty often met with in this kind of opera

tions The animal is still alive

The appearance of an empyema in this case was no surprise to me. The mere fact that the animal vomited just before the completion of the anastomosis, thereby soiling the entire operating field, would seem sufficient to account for it. Besides, the occlusion was not perfect everywhere, a fistula discharging stomach contents became temporarily established.

It is interesting to note that the infection took place along the track of the operation, involving the pleural and not the peritoneal cavity. Of considerable additional interest to me was the following incident that occurred during the operation, which certainly was done with admirable skill and precision

The supply of a certam size of silk had given out in the most of the work, and had to be replemshed without interfering must the physical conditions of the chamber. Here the wisely arranged anteroom, as shown in the accompanying illustration (Fig. 4), and described in Sauerbruch's exhaustive article referred to above proved of invaluable utility. The attendant out side of the box was informed of the need, and promptly placed the desired sifk with the anteroom, shutting the door, which the winght. Now the suction pump included the anteroom in its sphere of action, after which the door between this compartment and the main room could be opened with immunity and the required silk obtained.

Surely, the arrangement of the chamber is most ingenious in every detail, being based upon careful experimental research as regards the required physical and physiological conditions And, in order that no mechanical accident may interfere with the operation, duplicates of all the parts of the outfit, from the engine down to the electric lights, are kept in readiness for instant substitution.*

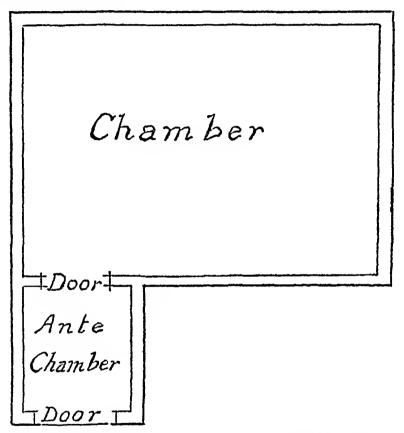


Fig. 4.—Showing the relation of chamber and antechamber. The latter can be put under negative pressure, too, and temporarily used as an additional room, if need be.

In his article "On Operations within the Thoracic Cavity with the Help of Sauerbruch's Box" (Deutsche med. Wochen-

^{*}Dr. Wilms, of Leipzig, has shown a way of communicating between those within and those outside of the box without the use of an especially constructed anteroom (Centralbl. für Chir., 1904, No. 8, p. 564). He also suggests a simplification in the construction of the Sauerbruch box, by making use of water to render the box air-tight. He would have the floor of the box separate and arranged with a gutter all around, filled with water, to receive the upper part of the box, the latter to be raised or lowered by pulleys. He further advocates the use of tin for the bottom and transparent celluloid plates for the upper part of the box.

schr, April 14, 1904), Professor von Mikulicz, after referring to some of his experiments done within the same, and expressing his satisfaction at the easy access he has been able to gain to the esophagus in his intercostal thoracotomies, points out the greater difficulties that exist in connection with esophageal as compared to intestinal resections

"The straight muscular tube," he says, "which we call 'cesophagus,' is but little stretchable, hence, even simple division and reuniting of the cut ends is not easily accomplished, as the œsophagus is slightly shortened thereby, and the consequent tension is apt to cause the divided ends to retract. In resections, of course, this difficulty is far greater."

Furthermore, the pleura, in most unwelcome contradistinction to the peritoneum, has little tendency to form rapid adhesions, and, hence, infection is often carried from without inward when draining the pleural cavity, no matter whether gauze, rubber drainage-tubes, or glass drains be used. As a result of such infection, emoyems sets in *

In view of all this, it is plain that the avoidance of a pneumothorax does not eliminate all obstacles in the way of our successfully operating upon the esophagus

Von Mikulicz classifies as distinct types resections of the upper and resections of the lower portion of the cosophagus, the latter offering much less difficulty than the former, for the reason that here the cardiac portion as well as the fundus of the stomach can be drawn up sufficiently to make up for the defect caused by the resection. This type of cosophageal resection is best carried out by an anterior intercostal thoracotomy in the fifth or sixth intercostal space.

According to von Mikulicz, the term "Thoracotomy" should comprise all incisions of the thoracic cavity, the same as laparotomy is understood to cover those of the abdomen

For resections of the upper thoracic portion of the ecsophagus, posterior thoracotomy in the third to fifth intercostal space

[•] For the purpose of reducing or eliminating the danger from infection during the after treatment, 10n Mikulicz has constructed a small box, which is placed upon the wound so as to shut it off from all outside air

has been found to give best results. The tube is here exposed right behind the hilus of the lungs. The vena azygos, which crosses the œsophagus at this place, is either pushed aside or doubly ligated and divided. Although it is feasible to sufficiently stretch the two ends of the resected œsophagus to perform anastomosis, the tension, as indicated above, would be so great as to make it doubtful that the sutures will hold. For this reason von Mikulicz no longer attempts to reunite the divided ends of the œsophagus after high resections, but instead has adopted the following procedure:

The distal end of the œsophagus is closed and dropped back. Then the wound in the thorax is carefully closed by layer sutures, and the proximal stump pulled out of an incision made along the lower end of the anterior border of the sternocleido muscle. This is easily accomplished because of the loose connective tissue around the esophagus in the median line. The neck wound having been closed by sutures, this upper end of the œsophagus is then drawn underneath a bridge of skin and its end fixed in a small new incision above the second intercostal space, the step being similar to that employed in gastrostomy according to the Ssabanejew-Frank method. von Mikulicz's intention later to unite this opening with the gastric fistula by means of a special apparatus, thus making possible a way of feeding by mouth. A gastric fistula has, of course, to be established in all these cases. Unfortunately, the experiments for this purpose cannot be done upon dogs, as they do not stand feeding through a gastric fistula. But the descent of food into the stomach after such a procedure could be accomplished only by massaging the bridge of skin which substitutes the defect in the œsophagus.

No doubt it will be extremely interesting to watch future developments in this direction. Certainly, as von Mikulicz so eloquently points out in closing his article, these are highly interesting surgical problems of the future, in which our imagination is given almost unlimited scope.

To my mind, there does not seem to be any valid reason why the same good result that was obtained in the operation

upon the dog described above, should not be obtained in the human subject, and, if such an operation should prove successful in a case of cancer at or near the cardia, the prognosis would be rather good in view of the slight tendency of esophageal carcinoma to form metastases

So far, the few resections of the œsophagus done on the human subject within Sauerbruch's box at the Breslau Clinic (three in number) have resulted in the patients' death

Since then Sauerbruch has not been idle * He has perfected the technique in a conclusive way, at least in animals In the Centralblatt fur Chirurgie, January 28, 1905, he publishes his present method of operation. It certainly must be gratifying to American surgeons to know that the Murphy button has been the means of making these operations feasible and safe.

Sauerbruch distinguishes two methods

- r Anastomosis between œsophagus and stomach,
- 2 Resection of the esophagus

These operations, it seems to me, may well be compared with our operations on the stomach done for carcinoma of the pylorus, viz

In mextirpable growths on the stornach, gastro-enteros tomy, on the esophagus, esophagogastrostomy, in excisable strictures, benign or malignant on the stornach, resection of pylorus with closure of either end, plus gastro enterostomy, on the esophagus, esophagogastrostomy, resection of the diseased portion and closure of either end

I Anastomasing Æsophagus and Stomach — Having exposed the ecsophagus as Gescribed above, under strictest aseptic precautions, the anatomical relations of the various parts surrounding and covering it are not disturbed in the lenst. The double serous covering of the cardiac portion of the ecsophagus, viz, pleura and peritoneum, are incised at the foramen esophageum, the abdominal cavity thus having been opened, the stomach is pulled into the thoracic cavity. Now, one-half

^{*} This portion of the article, describing the recent evolution of Sauerbruch's technique represents a later addition.

of Murphy's button is introduced from without, by the narcotizer, on an œsophageal sound grasped by the operator, his fingers resting on the outside of the tube and pressed against the anterior œsophageal wall; a short incision over the stem makes it appear. No purse-string suture. In cases of stricture of the cardia, the other half of the button is tied in the fundus of the stomach, and union effected by pushing the two halves together. The stomach is, of course, lifted up to the œsophagus. Careful suture with silk of the diaphragm to the portion of the stomach that has been pulled into the pleural cavity. It is of importance to see that no traction is produced on the stomach by the excursions of the diaphragm; if so, a greater portion of the stomach has to be transposed intrapleurally. Then the anastomosis, diaphragmatic sutures, and pleura are touched with Lugol's solution to induce rapid formation of adhesions; irrigation of the pleural cavity with saline solution and closure of the wound.

Thirteen dogs were thus operated upon and all recovered. Three died suddenly later. Autopsy in two of them showed that the stomach, much distended with fluids, had suddenly slipped into the pleura, compressing the heart. Careful suture will guard against this accident.

2. Resection of the Esophagus.—Esophagogastrostomy by means of the button, as before. Then, the nervi vagi are isolated two centimetres below the perfected anastomosis, the esophagus compressed with an intestinal clamp and ligated with a strong silk thread; division. The same maneuvre at lower end of portion to be resected. Inversion of the latter into stomach by means of purse-string suture; stitching of stomach against upper stump in order to protect ligature (inversion here impossible). Closure of wound as above described.

Of eleven dogs operated upon in this way, every one recovered.

Besides these two typical operations, Sauerbruch has worked out a third procedure for resection of the cardia and the lowest portion of the œsophagus. He calls it the *inversion method*. It is done in two sittings.

First Step —Thoracotomy, separation of diaphragm from esophagus, isolation of nervi vagi, as before, then inversion of the lowest part of the esophagus into stomach, the latter having been drawn up into the pleural cavity. Circular fixation of stomach to esophagus by means of silk sutures. By this manœuvre a protrusion is made into the stomach not unlike the portio vaginalis uteri, consisting of the inverted cardia and the lowest end of the esophagus. Suture of diaphragm to the wall of the displaced stomach, as before

Second Step —Fourteen days later Laparotomy, pulling out of the stomach and opening same Under guidance of the fore and middle finger of the left hand introduced into the organ, the inverted portion of the ocsophagus is cut off with Cooper's scissors Hæmorrhage is slight, closure of wound in stomach and abdominal wall

This operation too, has proven signally successful in experiments upon animals. For practical purposes, it is, of course, indicated only in cases of small, clearly circumscribed tumors of the cardia, or lowest portion of the escophagus Sauerbruch calls it "the ideal procedure for resection of circumscribed, small tumors of the lowest end of the escophagus or cardia".*

It is of importance to state that Sauerbruch has tried all these methods on the human cadaver and found the anatomical relations exactly the same, so that he sees no reason why the successes that attended his operations upon the living dog should not be repeated in the human subject. No doubt we shall soon hear from the Breslau Clinic with regard to these operations performed on man

What has been definitely shown thus far, however, is the great safety with which resections of the thorax can be done in the human subject under negative pressure obtained by means of Sauerbruch's box, and there can be no doubt that numerous other operations in which the pleural cavity is opened

^{*}A fourth operation was devised by Sauerbruch for resection of the portion corresponding to the bifurcation of the trachea and of that above this place. It is also done at two sittings. The defect is closed by plastic operation.

with or without intent, as, for instance, those on the heart, for traumatic rupture of the diaphragm, for attacking a tuber-culous affection of the vertebral bodies in Pott's disease, etc., may also be much more safely done within Sauerbruch's box.

The principal point in connection with intrathoracic operations at the present moment seems to be the question as to whether negative or increased air-pressure should be employed.

A few weeks after the publication of Dr. Sauerbruch's article, a short communication by Professor Brauer and Dr. Petersen, both of Heidelberg, appeared in the Zeitschrift für Physiologische Chemie, Vol. xli, Tome 4, and was soon followed by a more extensive résumé of the subject by the same authors, read at the Surgical Congress in Berlin. In it they pointed out the greater simplicity of the procedure, if done under increased instead of negative air-pressure, the employment of the latter always requiring an especially constructed box. They made the animal inhale oxygen from a tank, to which the vapors of the anæsthetic were added by a special arrangement of the bottles (Fig. 5).*

However, von Mikulicz had already carefully weighed the pro's and con's of the two methods, and Professor Brauer, in a later article (*Centralbl. für Chirurgie* No. 14, Beilage, April 9, 1904) acknowledges the priority of the Breslau Clinic in working out this question in all its various aspects.

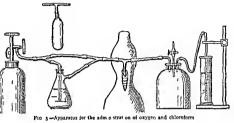
Von Mikulicz states (*loc. cit.*) that, if increased pressure were shown to be equally as good as decreased or negative pressure, the technique for the production of the required pressure difference between bronchial tree and pleural surface could probably be greatly simplified. Among the possibilities considered by him are:

- I. The use of a sort of a diver's helmet surrounding the neck in an air-tight way, the air entering and leaving the same under increased pressure, the narcotic being mixed with it.
- 2. A narcotizing mask closing mouth and nose air-tight, such as is used by dentists for nitrous oxide anæsthesia. Here, too, the narcotic would have to be mixed with the air.

^{*} Mitteilungen aus den Grenzgebieten, Vol. xiii, Tome 3, page 483.

The danger in connection with these two devices would seem to lie in the possibility of the subject's vomiting

3 Same as under 2, with the exception that tracheotomy is done, and respiration goes on through a tube fitting air tight in the trachea



Petersen and Brauer have successfully tried this latter method on animals,* employing an accurately working pump and tank filled with oxygen, with which the narcotic was mixed (Fig 5)

Sauerbruch's chamber, being arranged for increased as well as negative pressure, could, of course, also well be employed, although it would represent a more costly and complicated device than those above suggested

Another method, still has been recently proposed by Dr I Kuhn, of Cassel, Germany (Centrally fur Chirurgie, 1904)
This author has worked for some years on per oral and per nasal intubation, and has now evolved a method of pulmonal anaesthesia produced as follows Nose and his are tightly closed, a rubber tube is introduced into the trachea by intubation, at the level of the mouth, this tube passes through a wide

^{*}It has been acknowledged by von Mikulicz that Brauer conceived the idea of using increased pressure for intrathoracic operations independently from and without knowledge of the experiments done at the Breslau Clinic. (Mittellungen aus den Grenzgebieten der Medicin und Chrurgie Vol xiii, Tome 3 p 483 foot note.)

rubber bandage which surrounds head and neck and, at the same time, holds the tube in position. In this way the lips are closed air-tight, clamps being added for greater safety, if deemed necessary. The nose is closed by compression. Chloroform and oxygen are used. Expiration takes place through Brauer's water-valve under pressure which can be regulated according to the need of the case (Fig. 5). In an article entitled, "No Pressure nor Vomiting during Anæsthesia" (Berl. klinische Wochenschr., 1903, No. 17), he anticipates the objection which, naturally, at once arises in every surgeon's mind,—i.e., what is to be done if the patient should vomit during such an anæsthesia with mouth and nostrils tightly shut,—by declaring that patients thus narcotized do not vomit.*

Personally, I do not think that the method of applying increased air-pressure after tracheotomy will ever find favor in operations on the œsophagus of the human subject, as it complicates matters very considerably. Just imagine a patient of fifty years or older undergoing resection of the œsophagus with a trachea wound and cannula in place. Would not the chances of contracting pneumonia during the after-treatment be greatly increased?

Furthermore, it must be remembered, with all these methods requiring the use of increased pressure, that if anything should happen to any of the apparatuses employed—except when using Sauerbruch's box for the purpose—death would instantly set in, and no amount of duplicate parts could be of any possible use.

This danger is excluded when operating under negative pressure in Sauerbruch's box, since here the defective part could be replaced (duplicates always being kept on hand) without deleterious effect to the subject.

The principle demonstrated by Sauerbruch's discovery is, that rhythmical, artificial charging of the lungs with air, corresponding to normal respiration—as has been long done by

^{*} Since reading this article, another way of narcotizing under increased pressure has been described by Dr. H. G. Engelken, *Deutsche med. Wochenschrift*, 1904, No. 51.

physiologists—is not necessary to continue respiration with the thoracic cavity opened, but that spontaneous respiration goes on regularly and uninterruptedly, if a pressure difference is maintained between the air entering the bronchial tree and that to which the pleural cavity is exposed. This normal respiration goes on uninterruptedly, it may be added, even if the greater part of the thoracic wall is resected.

On the other hand, if the operation in question could be done as well and as safely on the whole, under increased airpressure, this method would seem to deserve the preference from a clinical as well as financial stand point. Operations under increased pressure would not have to be done in a closed box, but could be performed before a large audience the same as any other operation, and therefore would not necessitate the construction of a rather costly, special apparatus which here in America would hardly be procurable for less than from \$3000 to \$4000.

Of course, the great loss of animal heat would have to be considered, if these intrathoracic operations were done in our usual operating rooms *

In a letter to me of November 3 1904, Dr Sauerbruch states that at a recent meeting of physiologists an overwhelm states that at a recent meeting of physiologists an overwhelm ing majority declared themselves in favor of negative pressure for intrathoracic operations, on the ground that here the physiological conditions remain undisturbed, while in the increased pressure methods the alveolt of the lungs are neces sarily greatly distended. Sauerbruch adds that it will remain to be seen what surgeons think about the subject.

I feel sure that American surgeons will take part in this important research work, and do their share in solving the many interesting questions still awaiting decision

^{*} According to Sauerbruch's experiments, several degrees of heat are rapidly lost if animals (rabbits or dogs) with one thoracic cavity opened are exposed to the ordinary atmospheric temperature. This is due to the great blood supply of the lungs and the exposure of the heart. With regard to operations, the effects of chloroform or ether—both reducing the bodity temperature—have to be considered as well as the loss of blood. In the box the loss of heat through the opened thoracic cavity is reduced to a minimum.

GASTRO-ENTEROSTOMY AND PYLOROPLASTY.

AN EXPERIMENTAL STUDY BY MEANS OF THE RÖNTGEN RAYS.

BY WALTER B. CANNON, M.D.,

AND

BY JOHN BAPST BLAKE, M.D.,

OF BOSTON, MASS.

(From the Laboratory of Physiology and the Division of Surgery in the Harvard Medical School.)

THE purposes of the operations most frequently performed on the stomach are relief from the distress and disturbed functioning that arise from pyloric obstruction, control of intragastric hæmorrhage, and removal of malignant pathological tissue, usually from the pyloric region. The two prominent methods for the relief of non-malignant pyloric obstruction are the surgical anastomosing of the intestine with the stomach at some point other than the pylorus,-gastro-enterostomy; and the artificial enlargement of the pyloric opening, -pyloroplasty. For the removal of growths in the pyloric region pylorectomy is the natural procedure, but with pylorectomy and the special treatment of gastric hæmorrhage this paper is not concerned. What is here presented is a discussion of gastro-enterostomy and pyloroplasty as surgical methods of obviating non-malignant pyloric stenosis. discussion evidence is brought forward from clinical sources, from recent physiological investigation, and from observations on animals on which gastro-enterostomy or pyloroplasty has been performed.

THE TECHNIQUE OF THE OPERATIONS AND THE METHOD OF EXAMINATION.

The animals used were large cats, preferably females, since they are usually more quiet than males when fastened down for X-ray examination. The last feeding was at least

twelve hours before the operation The animals were always completely etherized The hair over the mid abdomen just below the ensiform cartilage was clipped closely with scissors, but not shaved. This area was then washed with soan and water, scrubbed with a sponge of sterile absorbent cotton wet with ether, and occasionally with alcohol The cat was then covered with a large square of sterile cotton cloth, with a slit over the site of operation. The instruments were boiled for five minutes The sponges were bits of absorbent cotton. sterilized in mass, and torn into pieces of suitable size, a few sterile gauze strips were used Suture material was either silk or linen thread white or black, the threaded needles were immersed in alcohol without boiling. The operator's hands were prepared by scrubbing with a wood pulp brush, common soan, and running water, followed by immersion in alcohol for two minutes. Gloves were not used

Every effort was made to avoid unnecessary manipulation of the abdominal contents. The incision was invariably in the median line just below the sternum. The anastomoses were all made by continuous suture and without clamps, though in another series of cases clamps would be used at least in some of the operations. Before closing the wound, the omentum was always replaced in as nearly its normal position as possible. The peritoneum was usually closed separately, with catgut, and the fascia and skin together, either with catgut or silk. The dressing consisted of sterile cotton and collodion. The cats were given boiled water after eight hours, and gradually returned to their usual diet.

In spite of efforts to obtain an empty alimentary canal at the time of operation, food of some sort was usually present either in the stomach, the intestine, or both, and small worms (Ascardes) almost invariably emerged from the incisions in the intestine. Three cats died as a result of the operations, the others lived for months and grew fat. In the fatal cases death was due to obstruction from kinks at the distal end of the anastomosis, once from a twist in the mesentery, and in another case from beginning local gangrene of the gut in the

region of attachment. The gangrene was perhaps due to the fact that the incision in the intestine was made accidentally on one side and too near the mesenteric border, thus possibly interfering with the blood-supply of the gut. Neither in these cases, nor in any of the autopsies on the other cats, was there a sign of peritonitis. The junctions were invariably found tight, and the anastomoses patent. In one of the early experiments, when food was seen to leave the stomach always through the pylorus and never through the new opening, it was supposed that the anastomosis had in some way closed. The abdomen was opened, the gut opposite the site of the anastomosis incised, the aperture demonstrated to be patent, the gut returned, and the wound closed; then the food was observed as before to leave by the pylorus and not by the artificial way. The difficulty of forcing food to leave the stomach through a gastro-enterostomy opening, when the pylorus is patent, had not at that time impressed itself upon us as it did later.

In considering operations of this character, it must be remembered that the cat does not have a retroperitoneal duodenum; the only part of the small intestine of the cat which is not freely movable is at the end of the duodenum which is anchored by a rather delicate fold of mesentery; and the cat, walking upon all fours, and sleeping usually upon its side, presents conditions in regard to anterior and posterior gastroenterostomy which are almost the reverse of those which obtain in man. For practical purposes, an anterior gastro-enterostomy in a cat corresponds to a posterior operation in man.

The gastro-enterostomy operation was varied by placing the anastomosis, or *stoma*, as we shall call it, at different points on the front and back of the stomach, by making the aperture large or small, and by uniting the gut with the stomach, so that gastric and intestinal peristaltic waves corresponded in direction, or were opposed. The two pyloroplastic operations employed were the Heinecke-Mikulicz operation and that devised by Finney.² These two classes of surgical method will be considered in turn.

For purposes of observation, two varieties of food were fed the operated animals. Thin boiled starch (three or four grammes potato starch to 100 cubic centimetres water) was used to test the passage of fluid contents from the stomach. This food was introduced into the stomach by a rubber tube. Canned salmon was used as a more natural food to test the passage of a semisolid substance from the stomach. The salmon was always eaten voluntarily. Before the food was given, it was mixed with a small amount of subnitrate of bis muth, which rendered the mass opaque to the Rontgen rays. The course of the food in the alimentary canal could then be easily watched by means of a fluorescent screen.

With this method, the effects of the two classes of surgical procedure, gastro enterostomy and pyloroplasty, on the passage of food from the stomach, were studied

GASTRO ENTEROSTOMY

The advantages said to arise from the performance of gastro-enterostomy are several. First of all, the new opening, if made at the most dependent part, is supposed to act as a drainage outlet for the gastric contents. This drain, in offering a new exit for the food, is thought to relieve the pressure on the pylorus and to decrease the amount of food going through the pyloric passage, or even to put that passage entirely out of function. With this new and easier way for the food to emerge from the stomach the work of the gastric musculature in forcing the food onward is diminished. And, finally, the shorter stay of the food in the stomach decreases the chances of fermentation and its attendant distress.

In the consideration of gastro enterostomy which follows, the subject will be presented under five heads drainage, the victous circle, kinks, the disturbance of digestive processes, and the formation of jejunal ulcers

Drainage—In stating that the presence of an opening between the most dependent parts of the stomach and a loop of intestine "drains" the stomach, it is assumed that the stomach is a relatively passive bag, and that the food, which is swal

lowed in a semisolid condition, somehow becomes liquid and runs into the intestine through the hole at the lowest point in this bag. There are a number of facts which should be taken into consideration before credence is given to the idea that the stomach is emptied by simple gravity drainage.

I. The Stomach not a Passive Bag.—First of all, the stomach is not at any time during digestion in the condition of a passive reservoir.3 Within a few minutes after food is ingested peristaltic waves begin to pass over the pyloric half of the stomach, and these waves continue sweeping up to the pylorus so long as food remains in the stomach. The statement is repeatedly found in surgical literature that a gastroenterostomy opening relieves the pylorus of the irritation from food and gastric juices. It seems to be assumed that a gastroenterostomy midway in the stomach renders the region between the opening and the pylorus unnecessary for digestion and inactive. There is no reason for believing that peristalsis does not persist under these circumstances, and that the food is not thoroughly churned in the pyloric end by the peristaltic waves. No one should deceive himself by supposing that there is relief from the presence * of motor activity or acid secretions near the pylorus, after a gastro-enterostomy. We have seen the waves passing over the pyloric end of the stomach ceaselessly for long periods when the pyloric sphincter was externally ligated or completely closed by sutures. In short, then, the pyloric end of the stomach serves to mix the food with the digestive juices, to triturate the larger lumps of food, and, under normal conditions, to propel the chyme into the intestine whenever the pylorus opens and allows the chyme to pass.

The cardiac end of the stomach is the reservoir part of the organ. But this reservoir is not a passive reservoir. The muscle fibres extend in all directions over the cardiac end, and during digestion these muscles are in a state of tonic contrac-

^{*}It is, of course, certain that gastro-enterostomy performed after pyloric obstruction shortens the duration of the presence of peristalsis and acid juices in the pyloric end of the stomach.

tion, pressing on the food within and forcing it into the churn ing process in the antrum as rapidly as it can be received. Finally, as the food is pushed more and more into the intestine the stomach becomes gradually shorter. As might be expected from the prevalence of longitudinal muscles along the greater curvature the shortening is more noticeable there than along the lesser curvature.

2 As the Stomach empties, the Pylorus becomes the most Dependent Point -An important result of the shortening of the stomach as it empties is the change of position of the most dependent part. The greater curvature of the stomach in the cadaver or in a living person relaxed in anæsthesia commonly reaches a point considerably lower than the pylorus But the shape and position of the stomach under such circumstances are not the same in the functioning organ Observations with the Rontgen rays on the normal human stomach containing food mixed with bismuth subnitrate b prove that the shorten ing of the stomach takes place just as if the longitudinal and oblique fibres passing over the surfaces to the greater curva ture lifted the organ up towards the one fixed point of the con tracting fibres -the cardia Since the pylorus is more or less fixed it does not rise with the rest of the stomach. The consequence is that in the last stages of digestion, when the gastric contents are more fluid than in the earlier stages, the pylorus becomes the lowest point in the stomach,* and the contents therefore do not have to be moved upward in order to be passed out (Fig. 1)

Doubtless it may be argued that observations on a normal person do not hold good for abnormal conditions. It may be said that the attachment of the intestine to the stomach acts as a drag, keeping the stoma at the most dependent point, and that then the stomach must be merely a passive reservoir.

Bettman (Philadelphia Monthly Medical Journal 1899 i p 133) has made post mortem observations on the human stomach in a state of contraction after several days fast. The pylorus is then the lowest point He finds that as the stomach is slowly filled with water the greater curva ture gradually becomes lower than the pylorus

with its contents drained by gravity. Or it may be urged that when the stomach is dilated, toneless, and flabby, it cannot act normally, and the part observed to be lowest when the abdomen is opened must remain so. In answer to the first argument, that the point of union of stomach and intestine does not change position, the freedom and ease of movement of the intestinal coils may be cited as evidence against any firm fixation of the united parts in one place. If, however, the stomach is purposely attached to a fixed portion of the gut with the object of making the stoma permanently the most dependent point, it may be questioned, in the light of the evidence which is to follow, whether such a procedure, as a ready

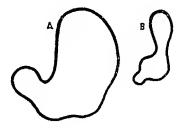


FIG. 1.—Tracings of the outlines of the gastric contents, made by means of the Röntgen rays, one hour (A), and four and three-fourths hours (B), after eating bread and milk mixed with bismuth subnitrate. Peristaltic waves are passing over the stomach. The line below the figures indicates the level of the umbilicus. The subject was a girl of seven years. The tracings are one-fourth original size.

means of clearing the stomach, is justifiable. In case the stomach is dilated and toneless the lowest point may remain the lowest point if there is no improvement in the condition of the stomach after the operation; but as the tonicity of the gastric musculature returns, the lowest point chosen by the surgeon is as little likely to remain the lowest point as is the case in the normal functioning organ.

Thus far, then, we may say that any point on the surface of the stomach, not near the pylorus, that is chosen as the lowest or most dependent point for purposes of "drainage" is in danger of being lifted, as the stomach shortens in emptying, until it occupies a position considerably above the part nor-

maily lowest towards the end of digestion, namely, the pylorus This fact, coupled with the fact that so long as food remains in the stomach peristalite waves move continuously towards the pylorus, argues strongly in favor of placing the stoma, not at what happens to be the most dependent point when the abdomen is opened, but near the pylorus, towards which the food is normally pushed and from which the food is most readily passed on into the intestines

2 Intra abdominal Pressure Relations make Gravity Dramage impossible -- The most important factor which must be considered in coming to a decision regarding the question of "dramage" is the factor of pressure relations within the abdominal cavity, and especially in the two parts of the stom The intra abdominal pressure, i.e., the pressure exerted on the outer surface of the stomach and intestines, is much less than is commonly supposed, for it varies only a few centimetres of water from the atmospheric pressure 7 The pressure within the alimentary canal, when the canal is mactive, depends on the weight of the overlying organs. This fact was proved by Weisker 8 hy measuring the pressure in stomach and rectum hy means of manometers. He found that in dorsal decubitus the water in each manometer rose to the highest point of the ahdominal cavity. In the upright position the water in the gastric manometer stood at the level of the siphoid process. hut in the head down position, when the stomach was subjected to the pressure of the freely movable abdominal contents, the water in this manometer rose to the level of the anterior superior spine of the ilium Similar changes of pressure can be observed in the mactive stomach as the subject lies either on the right or on the left side on the right side the intragastric press ure varied hetween one and five centimetres water, on the left side, with the liver above the stomach, the pressure varied between thirteen and nineteen centimetres water 9 Kelling has shown also that the intragastric pressure increases only slightly even with a large increase of contents, so rapid is the adaptation of the organ to different quantities 10 The pressure inside the resting stomach and outside the stomach in the

abdominal cavity or in neighboring coils of intestine is approximately the same unless the body is resting on the left side or head downward.

The importance of the considerations in the foregoing paragraph lies in the bearing of these considerations on the question of drainage. The weight of the alimentary canal, as such, must be approximately that of water, which is approximately the weight of the swallowed food. The alimentary canal is not a rigid tube; its walls, unless contracting, are limp and flabby. The limpness and flaccidity of the walls cause the food contained within the canal to be pressed upon by a medium of about the same density as the food itself. To be sure, food pushed into a vertical loop held open by gas would fall by gravity through that loop, but such a condition is not to be regarded as at all usual. Under normal circumstances, therefore, with the walls of the canal in contact or closely surrounding the contents, gravity cannot act, and "drainage" in the common sense of that term is impossible.* In order that the food may be moved onward through the alimentary canal, muscular contraction is necessary to create a difference of pressure.

4. Intragastric Pressure is greatest at the Pylorus.—In the digesting stomach a difference of pressure would naturally be expected between the less active cardiac end, holding the food in a tonic grasp, and the more active pyloric end. As the pylorus is approached the pressure should be greater, for the peristaltic waves run downward in a series of several distinct constriction rings, and these rings, as they approach she

^{*}Kelling (Archiv für die Verdauungs-Krankheiten, 1900, vi, pp. 455, 456) has also pointed out this fact. He writes: "The stomach is so well supported by the intestinal loops, which surround it, which adapt themselves to its form, and which have a specific gravity about that of water, that we may assume without essential error that it floats completely in water. Thus the labor of the stomach is relieved of the weight of the ingesta. . . . If we fill a gastro-enterostomized stomach with water, the water does not run out by itself, even with the patient in the upright position—because of the hydrostatic relations in the abdomen gravity can have no effect."

pylorus, squeeze deeper and deeper into the gastric contents So great is the pressure under which the food is forced up to the pyloric sphincter that, when the sphincter does not relax, the food is squirted back through the advancing ring of peristalsis sometimes half the length of the antrum, and when the sphincter does relax the food is shot for some distance along the duodenum 11 Actual measurement of the pressure in the cardiac and pyloric ends of the human stomach have been made Von Pfungen 12 found in a boy with a gas tric fistula eight centimetres to the left of the linea alba that the intragastric pressure near the fistula was upward from nineteen centimetres water, whereas directly in front of the pylorus the pressure was 162 centimetres water Moritz has studied a normal individual, and, although his figures are lower than you Pfungen's, they show a similar difference be tween the two ends of the stomach. The average pressure in the cardiac end was six to eight centimetres water, while in the pyloric end there were rhythmic recurrences of pressure amounting in some cases to thirty-eight, forty, and even sixty centimetres water, though, as a rule, ranging from twenty to thirty centimetres 13 The evidence is conclusive that the peri staltic waves sweeping towards the pylorus cause the pressure on the food in the antrum to be much greater than it is in the less active cardiac end

5 Food goes through the Pylorus rather than through the Open Stona—The difference between the pressure at the pylorus and the pressure elsewhere in the stomach is important in its bearings on the discharge of food into the intestines. If there are two ways from the stomach to the intestines if there are two ways from the stomach to the intestines, the pylorus and the stoma, does the food pass out naturally by the pylorus, by both ways, or more readily by the stoma? Observations were made on ten cats on which gastro-enterostomy had been performed and the pylorus left untouched. In these cases the new aperture between the stomach and intestine was placed as follows two in the anterior wall, one in the posterior wall, one in the posterior wall, one in the posterior wall, just before the narrowing of the

stomach that forms the antrum; and one in the posterior wall of the antrum. The stoma was varied in size: in two cases it was found at autopsy to be oval and about one and a half centimetres in length, in other cases it has two, two and a half, and even three centimetres in length.

When fluid boiled starch was given to the ten animals above enumerated, this fluid, instead of running through the stoma into the intestines, was forced out naturally by peristaltic waves, through the pylorus. Only two exceptions were observed, one in the animal with the stoma in the posterior wall of the antrum close to the pylorus, and the other in an animal with a large anterior stoma (three centimetres long) about half-way between the two ends of the stomach. The food left by both exits. But in the latter case canned salmon, less fluid, went out by the pylorus alone; it was not observed to pass through the stoma at any time during four and a half hours after feeding.

In one instance the pylorus was partly occluded. A tape was passed through the walls of the stomach in front of the pylorus, and tied; then the gastric wall was sewed tightly over the entrance and exit of the tape. The food still passed out by In another instance a linen ligature was tied the pylorus. snugly about the pyloric sphincter. A week later liquid boiled starch was fed, and, although peristaltic waves were continually sweeping up to the pylorus, the food was observed to pass out wholly by way of the stoma. Still later, when thick salmon was fed, the stomach was watched for the first three-quarters of an hour, and from two to two and a half hours after the feeding. No food was seen going from the stoma, but it was seen leaving in small amounts through the pylorus. At autopsy the ligature was found partially embedded, and the pyloric opening was about a third of a centimetre in diameter. These cases clearly show that even when the pylorus is narrowed so as to offer difficulty to the passage of the chyme, the chyme is forced through the natural way into the intestine rather than through an opening remote from the point of greatest pressure.

When salmon was fed, the food, with the one exception

above mentioned was never observed to leave the stomach through the stoma if the pylorus was patent. The salmon, a more solid food than the starch paste, adds to the greater pressure in the pyloric region still another factor which causes the pyloric exit to be the easiest exit, this factor is the greater fluidity of the food in the pyloric end of the stomach As long ago as 1834, Eberle noted that the food in the cardiac end of the stomach was relatively dry, while the contents of the pyloric end were mushy and fluid 14 This observation is readily confirmed by examination of the stomach of a dog or cat after an hour or two of digestion natural that a relatively fluid material under a general pressure should pass more readily from the stomach than a drier and more solid mass For this reason alone the chyme should go out through the pylorus sooner than the unchymified food through an opening in the middle of the stomach. And when this difference of consistency, favorable to the pyloric passage, is combined with the greater pressure in the pyloric region, the reasonableness of the results observed in the cases above reported is manifest

No difference was noted in the results from anastomoses on the front and from those on the back of the stomach. It may be that the operations were not sufficiently numerous to justify conclusions as to the relative ments of anterior and posterior anastomoses. But the evidence from the pressure relations in the abdominal cavity and in the stomach—the fact that the stomach is a muscular bag resting practically as if surrounded by water—indicates that the position of the stoma, anterior or posterior, has not the importance generally ascribed to it.

In the evidence presented in the foregoing paragraphs the physiology of the gastric movements has been considered with reference to its bearing on the emptying of the stomach after gastro-enterostomy operations. It has been made clear that peristalsis is seen only in the pyloric end of the stomach, that the pressure in the stomach is greater as the pylorus is approached, that the food in the pyloric end is much more fluid

than the food in the cardiac end, and that as a result of all these factors the food is more readily forced into the intestines through the pylorus than through the stoma, when these two exits are both offered. It should be observed that there is in these statements no slighting of the fact that improvements have resulted in clinical cases from gastro-enterostomy operations. The larger opening possible between stomach and intestine in the human subject may render the artificial passage-way relatively easier than it is in the small animals used for experiment; but the factors of peristalsis, pressure relations, and the difference of food consistency in the two ends of the stomach are as true for human beings as for these animals, and must make the pyloric passage in human beings an easier and more natural exit for the food than any artificial opening in other parts of the stomach. A justification of this conclusion is found in the experience of Mayo,15 who observes that when gastro-enterostomy is performed with the pylorus unobstructed, the food seems to take its natural course and the operation is of little use.

THE "VICIOUS" CIRCLE.—In the animals on which gastro-enterostomy has been performed and the pylorus left unclosed or only partly occluded, a circulation of the food has been repeatedly observed. The food was forced through the pylorus, was pushed thence through the duodenum (never in the opposite direction), and entered the stomach again through the stoma. Animals have been watched a half-hour at a time, and over and over again at short intervals during this period food has entered the duodenum from the pylorus, and gone through the regular course, only to merge once more with the mass in the stomach. Usually at these times no food was observed to pass into the intestine beyond the stoma. of interest and of practical importance to note that the circulation of the food described above was seen especially when the stomach was stretched either by large amounts of food or by the application of pressure to the abdomen when moderate amounts of food had been given. The reason for this result is clear when the stomach wall in the region of the stoma is stretched post mortem The stretching separates the edges of the opening to which the intestine is attached and as the edges separate the intestine becomes drawn tight between them (Fig 2). Thus the intestine forms a flat covering to the opening, it becomes in short, practically a part of the gastric wall* In the flattening of the intestine against the stomach, the opening into the intestine in either direction is merely a narrow slit, and these slits become still more narrowed to complete occlusion when pressure is applied to them from within



Fig 2—D agram showing how stretching the stomach may cause the part of the intestine sewed to the stomach to become almost continuous with the gasting wall and the openings into the intestine from the stomach to become mere sits. S stomach I nets in

the stomach The effectiveness of these 'valves' was tested in the excised stomach by tying the pylorus and filling the organ with water. As the gastric wall became stretched and the internal pressure increased almost no water escaped through the stoma into the intestine. And when the cardia was closed and the stomach and its fluid contents further pressed by hand the "valves' were still more effective in pre venting leakage.

Evidently the narrow slit like openings into the intestine, which result from stretching the gastric wall, fully explain

^{*}Kellung (Archw fur khnische Chrurgie 1900 lxu p 35) thinks that the uncous circle is due to making too large a hole so that when the stomach stretches the hole a spur of the intestine is formed projecting into the gastric cavity and preventing easy exit. But even with a small stoma the contraction of the circular fibres of the intestine must cause the gut to lie flat between the lines of ligature and bring about the condition described in our experiments and furthermore a small stoma from its smallness is less likely to be an effective exit. In this connection it is interesting to note that Moyniahan strongly advocates a large opening even four inches in length (Journal of the American Medical Association 1004 kliu p 1071)

the prevalence of the circulation of the food from pylorus to duodenum and back to stomach again through the stoma, when large amounts of food are given. These narrow openings act like valves. The slit on the duodenal side of the stoma permits food which has passed the pylorus to return without hindrance to the stomach, but both slits offer a distinct obstacle to the forcing of food outward from the stomach into the intestine. The obvious moral that meals should be moderate in amount in gastro-enterostomy cases need only be mentioned.

The circulation of the food described in this section has never resulted in the clinical symptoms of a "vicious" circulation. The animals have never vomited as a consequence of the repeated passage of the food from the duodenum into the stomach. Indeed, the recent observations of Boldireff ¹⁶ render it probable that in the stomach a certain amount of bile and pancreatic juice may be found quite normally. Kaiser ¹⁷ cites numerous observers who found after gastro-enterostomy in human beings that bile was almost invariably present in the stomach, and he does not regard its presence there as of unfavorable significance. Retention of food in the stomach, with subsequent repeated vomiting, such as attends the so-called "vicious circle," have been associated usually, in our experiments, with kinks and demonstrable obstacles to the easy passage of the food.

KINKS.—By far the greatest number of failures in our experimental gastro-enterostomies have been due to the formation of kinks. When the ease of movement of the intestinal coils one on another is regarded, the possibility of difficulties arising from the permanent fixation of a coil at any point is easily comprehended. Evidence of such difficulties is found in the acute obstructions caused by the kinks and flexures from adhesions between the intestines and the more stationary abdominal viscera.

In the cases of fatal kinking of the intestine observed by us, the trouble has invariably been located at the distal point of that part of the intestine which is attached to the stomach. The intestine beyond this point is ordinarily more freely movable than the loop between pylorus and stoma It may be that this freedom of movement favors the kinking, or that the shortening of the stomach as it empties, with the consequent forward pull on the attached intestinal loop, brings about a sharp turn of the gut at the point of junction with the stomach

Sharp turns in the intestine in normal conditions are undoubtedly readily straightened by the push of intestinal peristalsis. Bayliss and Starling ¹⁸ have described a local reflex of the intestinal wall, which requires peristalsis always to be a forward movement. Stimulation of the gut at any point causes contraction behind and relaxation in front of the point of stimulation. A mass of food in the gut must therefore move forward, and as it does so it causes a new region back of it to contract, a new region in front to relax. Thus the mass



Fig. 3—Diagram showing kink just beyond attachment of intestine to stomach interruption of the circular fibres at the stoma

progresses A mass of food driven forward by a peristaltic constriction must therefore act under normal conditions like the forcible injection of a flaccid rubber tube, in obviating kinks and bends and in making the way passable. It is im portant to note that conditions for straightening a kink at the end of a gastro enterostomy attachment are not present. At the stoma there is an interruption of the circular fibres (Fig. 3) The interruption of these fibres makes it impossible to apply to the turn in the gut a force which would make the gut straight. It is evident that the contraction of the interrupted circular muscle can result in no other effect than that shown in Fig. 2.1 c. a shortening of the intestinal wall between the attachments to the stomach The circular fibres in this region cannot get a grip behind a mass of food and push that mass forward straightening the gut. The only force tending to obviate the kink is the pressure of the food from the stomach, which in the cardiac end has been proved to be relatively slight. The persistence of kinks near the stoma is thus readily understood. Their effects in producing retention of food in the stomach, vomiting, and death have been observed several times in our experiments.*

FOODS LEAVING BY STOMA ARE NOT MIXED WITH IM-PORTANT DIGESTIVE JUICES IN THE DUODENUM.—Food which emerges from the stomach through the pylorus accumulates in the duodenum, and there undergoes the process of rhythmic segmentation.¹⁹ The rhythmic segmentation of the food serves to mix it thoroughly with the pancreatic juice and the bile. The great physiological importance of these secretions, especially the pancreatic secretion, in the digestion of all three classes of food-stuffs-carbohydrates, proteids, and fats-need not here be emphasized. The fact that the presence of the acid chyme in the duodenum is the normal stimulus to the flow of the pancreatic juice 20 is not so widely recognized by surgeons. Thus the food in taking its natural course causes the flow of the digestive secretions and becomes thoroughly mixed with them. If the food, instead of going through the duodenum, passes directly from the stomach into the jejunum or ileum, these functions are seriously interfered with. It is conceivable that a certain amount of pancreatic secretion may be carried into the jejunum and the ileum and there mixed with the food. And food may pass for a short distance into the proximal loop from the stoma. In our experiments food has repeatedly been seen passing from the stroma into the proximal loop (towards A, Fig. 3), only to be swept into the stoma again by a peristaltic wave. Since the circular fibres were not complete at the stoma, the food was not pressed past it into the distal gut, but was forced into the stomach. And no

^{*}We have never observed a reversed peristalsis in the small intestine returning intestinal contents to the stomach. Rosenberg (Archiv für die gesammte Physiologie, 1898, lxxiii, p. 419) has assumed this perversion of normal intestinal activity as the cause of vomiting after gastroenterostomy.

sooner had the wave gone by than the food was pressed back into the proximal loop. Thereupon a new peristaltic wave once more pushed up the food, but back it was pressed when the wave came to the cut fibres. This process, which we have seen repeated again and again, must have the effect of mixing some of the food, at least, very thoroughly with the digestive secretions poured into the duodenum.* But only a relatively small part of the food may be treated in this manner, and at best this is a poor makeshuft for the kneading process which normally mixes the juices and the food together.

JEJUNAL ULCERS —An occasional occurrence in connection with gastro-enterostomy operations is the formation of an ulcer in the jejunum opposite or near the stoma. The cause of such ulceration is not known, although it is commonly ascribed to a digestive process too active for the tissue to resist. When it is remembered that there is a mechanism between duodenum and stomach which prevents fresh food from leaving the stomach until the acid in the food already in the duodenum has been neutralized by bile and pancreatic juice, ²¹ the presence of ulcers in the jejunum in cases of gastro-enterostomy might well be due to the constant presence of acid in a region in which inorganic acid is not normally found ²². In this connection it is interesting to note that no case of ulcer of the duodenum after pyloroplasty has been reported ²³.

CONCLUSIONS AS TO THE BEST COURSE IN GASTRO

From the observations detailed in the previous division of this paper, certain conclusions can be drawn as to the best course in gastro enterostomy

DRAINAGE —It has been shown that there is no reason to suppose that "drainage" from the stomach occurs, in the sense of gravity drainage, but that food is pushed from the stomach,

^{*}Kelling (Deutsche Zeitschrift fur Chrurgie, 1901, lx, p. 157) has recorded a surgical case in which he was able to observe through a fistula the passage of some of the food into the duodenum from a gastro enterostomy opening

as it is pushed elsewhere in the alimentary canal, by pressure due to contraction of muscles in the wall of the canal. In the stomach the most effective muscular activity, peristalsis, is seen only in the pyloric end. Consequently, pressure is greater near the pylorus than anywhere else in the stomach; and food leaves through the pylorus, even the partially obstructed pylorus, rather than through an open stoma some distance away.

The obvious conclusion from these considerations is that the union of stomach and intestine should be made in that part of the stomach in which there is the greatest intragastric pressure, *i.e.*, as close to the pylorus as possible. In the animals observed by us the usual semisolid food invariably left by the pylorus rather than by the stoma, when the pylorus was open and the stoma was near the middle of the stomach. And the only case in which food left invariably by the stoma as well as by the pylorus was a case of gastro-enterostomy in the antrum pylori. If the stoma is to be placed in the most favorable position for use, therefore, it should be placed as close to the pylorus as possible.

The repeated observation of food forced from the stoma into the proximal loop, i.e., in the direction of the gastric peristalsis but opposite to the direction of the intestinal peristalsis (see p. 698), is suggestive of advantages to be derived from a coincidence in the direction of gastric and intestinal peristalsis in the region of the junction. The only case in which this coincidence was followed by an earlier discharge through the stoma than through the pylorus was the case already mentioned on page 690. In this instance the stoma was about midway in the stomach, but the opening was large,three centimetres in length. In other similar cases with openings only half as large, the food passed out by the pylorus rather than by the stoma. It is impossible to conclude from our cases that the coincidence in direction of gastric and intestinal peristalsis is of great advantage, but a large opening is evidently favorable for use.

"Vicious" Circle.—It has been shown in the previous division of this paper that in simple gastro-enterostomy a

circulation of the food from stomach through pylorus and back to stomach through stoma was a frequent occurrence Especially was this circulation seen when the stomach was well filled. The lips of the opening were thereby widely separated and the attached intestine stretched so as to become practically a part of the gastric wall. The openings into the intestine at the stoma were then only narrow slits. These are good inlet valves from intestine to stomach but they prevent easy exit.

The circulation of the food can be rendered less probable by Wolfer's second method (practically the Roux operation) or by a combination of gastro-enterostomy and entero-enter ostomy although in the latter case the circulation is still possible by direct forward peristalsis. One animal on which Roux's operation was performed was observed at intervals for almost three months. Whenever fluid food was given it invariably passed out both by the pylorus and by the stoma Proteids combined with fats are very slow in beginning to leave the normal stomach. "4 at one time when salmon was fed to this animal the salmon was seen going out by the stoma earlier than by the pylorus. Never was the law of forward intestinal peristalisis. 25 violated never was there a passage of the food back into the stomach.

With simple gastro enterostomy and an open pylorus the circulation of the food from stomach to intestine and back to stomach again cannot be prevented. The continuance of such a circulation is clearly favored by stretching the stomach with food. The taking of moderate quantities of food at a time is therefore advisable.

Kinks—It has been pointed out that intestinal kinks were repeatedly found at the point where the intestine leaves the stomach after being joined to it. These kinks are not readily straightened because peristaltic pressure cannot be brought to bear upon them the circular fibres rendered ineffective by the incision necessary to make the stoma, he too close to the obstacle.

It is evident that if this reasoning is correct the rational procedure is to attach a narrow band of the distal gut con

tinuously to the stomach wall for several centimetres beyond the stoma. The gut is thus prevented from making a sharp turn within a distance in which peristalsis is not effective. Food getting into this region which is kept relatively straight may now be clutched from behind by a peristaltic constriction, and possible bends lying further on in the intestine may thus be straightened by the force of the peristaltic movement.*

FOOD NOT MIXED WITH DIGESTIVE JUICES IN THE DUO-DENUM.—Food which passes out by the stoma is not mixed with the bile and pancreatic juice in the duodenum. And furthermore this food is not neutralized in the natural manner by the alkaline duodenal fluids. The occurrence of jejunal ulcers near the stoma may be thus explained.

These objections to gastro-enterostomy cannot be avoided, if the operation does what it is intended to do and entirely supersedes the pyloric passage as an outlet. On the other hand, if the food still goes wholly or chiefly through the pylorus the gastro-enterostomy is of little use.

All our observations on experimental animals, and the data collected from the literature, directed us to the pyloric region as the most advantageous location for an artificial outlet from the stomach. The difficulties arising from the circulation of the food by the so-called "vicious" circle, and from the non-mixture of food with the digestive and neutralizing fluids in the duodenum, are practically impossible to avoid in a simple gastro-enterostomy. And the danger from kinks when a movable part of the alimentary canal is fastened as a loop to a less movable or immovable point must always be present. Is not pyloroplasty in cases in which it can be used a much more rationally defensible operation for the relief of

^{*}Kappeler (Deutsche Zeitschrift für Chirurgie, 1898, xlix, p. 129) has noted in his cases the passage of food into the proximal loop of the attached intestine, and the failure of the distal loop to function because of the formation of a spur at the stoma. It is interesting to note that from clinical considerations Kappeler recommends (p. 144) fastening both the proximal and distal loops for four to six centimetres horizontally along the stomach for the purpose of avoiding spur formation.

pyloric obstruction than we have found gastro-enterostomy to be?

PYLOROPLASTY

The two forms of pyloroplastic operations are the Heinecke Mikulicz and the Finney operations, although Finney's procedure is sometimes wrongly classified as a gastro-duodenostomy. Both these operations have been performed on animals and the movements of the food studied by the method already described. As the results, so far as the passage of food from the stomach is concerned, were the same with both operations, a separate consideration of each of them is not necessary

By the normal mechanism of the pylorus the food is prevented from leaving the stomach until it has undergone gastric digestion. Thus, proteid food, digested in the stomach, does not begin to leave the stomach till later, departs more slowly, and is retained longer, than carbohydrate food of the same amount and consistency not digested by the gastric juices. And the reflex from the duodenum prevents the chyme from being discharged from the stomach in quantities so great as to overwhelm the important digestive processes begun near the opening of the pancreatic and bile ducts. The chyme emerges at irregular intervals in small amounts, and when a mass of food has accumulated in the duodenum rhythmic segmentation churns the food with the juices.

It is natural to suppose that by cutting the pyloric sphineter the digestive mechanisms controlling the exit of food from the stomach must be entirely destroyed. This supposition is not wholly correct.

When the animals on which pyloroplastic operations had been performed were fed either carbohydrate or proteid food, the discharge from the stomach began earlier and continued in greater abundance than under normal conditions. And although in some cases the duodenum became filled with food, the peristaltic waves continued running over the pyloric end of the stomach. But the discharge into the intestine was not entirely uncontrolled, for the operation does not interfere with the process of rhythmic segmentation in the duodenum (see

p. 702). This rhythmic contraction of the circular fibres of the intestine just beyond the stomach has been again and again observed in these cases of pyloroplasty. It is clear that the process of segmentation alone would check the discharge from the stomach, for the circular constrictions of the gut assume the function of the pylorus, and the gastric peristalsis cannot force the food past them. There is, therefore, in the duodenum a mechanism which serves to control the discharge from the stomach and to continue the mixing of the chyme with the pancreatic juice and the bile in the normal manner.

In favor of the pyloroplastic operations, the facts to be adduced are mainly the obverse of the disadvantages of gastroenterostomy. In the first place, the food is pressed out of the stomach normally by peristalsis. And after the pyloroplastic operations no circulation of the food is possible,—there is no way back into the stomach except in opposition to the normal movement of intestinal peristalsis. Kinks and sharp turns in the gut have no reason for existence or persistence,—there is no fixation of a free loop of the intestine. And, finally, foods are mixed in a normal manner with the digestive fluids poured into the duodenum. This mixing, by rhythmic constrictions of the intestine, prevents a too rapid discharge from the stomach, promotes the important digestive functions performed by the bile and pancreatic juice, and serves to neutralize the acidity of the chyme with these alkaline secretions.

SUMMARY.

The stomach is not a passive bag. During digestion the cardiac end slowly contracts, pressing its contents into the pyloric end. Over the pyloric end during digestion peristaltic waves are continually running, churning the food with the gastric juices and forcing the chyme into the intestine. Observations on the functioning human stomach show that as it empties it shortens, especially along the greater curvature. Therefore the part of the stomach lowest when the organ is full or relaxed is not lowest as it empties. The pylorus then becomes the lowest point. Even if "gravity drainage" oc-

curred, the pylorus is the natural outlet so long as the stomach retains its power of contracting

The pressure within the abdomen is approximately atmospheric pressure. The pressure in any part of the passive alimentary canal depends on the weight of the overlying abdominal organs. If the canal is mactive, the food therefore is as if surrounded by water. Gravity cannot act, and gravity drainage does not occur.

After an ordinary meal, the peristalisis of the pyloric end of the stomach makes the contents of this part more fluid than the contents of the cardiac end. Because peristaltic waves move towards the pylorus, the intragastric pressure is three or four times greater at the pylorus than in the cardiac end Observations on large cats with gastro-enterostomy openings of various sizes at various parts of the stomach showed that unless the opening, or stoma, was in the antrum (i.e., close to the pylorus) the food, even when fluid, was pushed through the pylorus rather than through the stoma

With peristalsis only in the pyloric end of the stomach, with the intragastric pressure much greater at the pyloris than elsewhere in the stomach, and with the food in the pyloric end normally more fluid than that in the cardiac end, the food is forced into the intestine through the pylorius and not through the artificial opening, when both ways are offered

Circulation of the food through the pylorus to the duodenum and back to the stomach through the anastomosis has been repeatedly observed, but it was not followed by the clinical symptoms of the "vicious circle". The circulation was observed best when the stomach was very full. The stretching of the stomach separates the lips of the stoma and draws the intestinal wall into line with the gastric wall. The openings into the intestine at the stoma then become mere slits, and act like valves, permitting the entrance, but preventing the exit, of the food

The clinical symptoms of the "vicious circle" have been observed in animals in which a kink of the intestine has been found just distal to the anastomosis Kinks at this point can-

not be straightened by peristaltic activity because the circular fibres of the intestine are cut at the nearby stoma.

It is important that food be mixed with the secretions poured into the duodenum; these juices are highly effective in digestion, and also neutralize the acid chyme. If food leaves the stomach by the stoma, it is not mixed with these secretions. Jejunal ulcers after gastro-enterostomy may be due to the presence of acid in a region in which inorganic acid is not normally found.

From the above considerations, it was concluded that the stoma should be large and as near to the pylorus as possible; that the circulation of the food be rendered less probable by avoidance of overeating, and that so far as possible kinks be obviated, by attaching a narrow band of the distal gut to the stomach for several centimetres beyond the stoma, thus permitting peristalsis to become an effective force.

The probability of a circulation of the food whenever the pylorus is left open, the non-mixture of the food with the digestive and neutralizing fluids in the duodenum, and the ever-present danger from kinks in gastro-enterostomy make the operation not an ideal one.

In pyloroplasty (preferably the Finney operation) these objections are avoided. And a too rapid exit of the food through the pylorus is prevented by rhythmic segmentation of the food in the duodenum, an activity which in part replaces the functions of the pylorus, and also mixes the food with the pancreatic juice and the bile.

REFERENCES.

¹ Mikulicz. Archiv für klinische Chirurgie, 1888, xxxvii, p. 79.

Finney. Johns Hopkins Hospital Bulletin, 1902, xiii, p. 155.

³ Cannon. American Journal of Physiology, 1898, i, p. 367.

⁴ Cannon. Loc. cit., p. 371.

⁵ Cannon. American Journal of Physiology, 1904, x, p. xix. See also Williams, The Röntgen Rays in Medicine and Surgery. New York, 1901, pp. 360, 365, and 370; and Rosenfeld, Zeitschrift für klinische Medicin, 1899, xxxvii, p. 83.

⁶Luschka. Anatomie des Menschen, ii, part i, p. 189. Luschka's figures are copied in Gray's Anatomy.

- Renrieff Centralblatt für allgemeine Pathologie und pathologische Anatomie, 1801, 11, p. 107,
- *Weisker Schmidt's Jahrbucher der in und auslandischen ge sammten Medicin, 1888, cexix, p 284
 - Moritz Zeitschrift fur Biologie, 1895, xxxii, p 325
 - "Kelling Deutsche medicinische Wochenschrift, 1802, xviii, n. 1162
 - "Cannon American Journal of Physiology, 1808, 1, p 360 "Von Pfungen Centralblatt fur Physiologie, 1887, 1, pp 220 and 275
 - "Moritz Zeitschrift für Biologie, 1895, xxxii, pp 356-358
 - "Eberle, Physiologie der Verdanung, 1834, p 100
 - "Mayo Boston Medical and Surgical Journal, 1904, cl, p 645
 - Boldireff Zentralblatt fur Physiologie, 1904 xviii, p 457
 - "Kaiser Zeitschrift für Chirurgie, 1001, Ixi, p 337
 - "Bayliss and Starling Journal of Physiology, 1800 xxiv, p 110
 - "Cannon American Journal of Physiology, 1002, vi. p 262
 - Bayles and Starling Journal of Physiology, 1002, xxviii, p. 325
- "Hirsch Centralblatt fur klimische Medicin, 1803 xiv. pp 73 and 377 Serdinkow Arbeiten der Gesellschaft russischer Aerzte in S Peters burg. August and October, 1800, p. 46
- Moore and Bergin American Journal of Physiology, 1900, iii, p
 - "Watts Johns Hopkins Hospital Bulletin, 1903 xiv, p 192
 - "Cannon American Journal of Physiology, 1004 xii, p 407
 - "Bayliss and Starling Journal of Physiology, 1800, xxiv, p 110.
 - " Cannon American Journal of Physiology, 1004, xii, p 401

RESECTION OF THE MIDDLE THIRD OF THE STOMACH FOR CARCINOMA OF THE GREATER CURVATURE.

END-TO-END ANASTOMOSIS; RECOVERY.

BY CHARLES L. SCUDDER, M.D.,

OF BOSTON, MASS.,

Surgeon to the Massachusetts General Hospital.

This case is of interest because (1) Carcinoma of the greater curvature of the stomach is unusual. According to Fenwick, 58 per cent. of all gastric carcinomata are pyloric. Upon the contrary, but 2.8 per cent. are of the greater curvature. (2) The growth did not infiltrate the submucosa as is commonly the case with pyloric carcinoma. (3) The growth had attained considerable size without causing many symptoms of gastric disturbance, for neither the pyloric nor the cardiac portions of the stomach were invaded. (4) The transverse colon was not involved in the disease. (5) An end-to-end anastomosis was done, using an interrupted Connell suture. (6) The technique of the operation was very greatly facilitated by the employment of clamps according to the methods of Kocher, Hartmann, Mayo, and Moynihan.

F. M. M. entered my hospital service in the summer of 1904. She was thirty-seven years old and married. She was well previous to March, 1904, at which time she began to have spasmodic pains in the abdomen, a little to the left of the umbilicus. These pains persisted for some days and then disappeared. The character of the pain was dull, pressing, deep-seated, below the tumor subsequently discovered. The pain was increased by coughing, sneezing, and bending of the body. On May 30, 1904, not having had any abdominal pain for some weeks, the patient discovered a small swelling to the left of the umbilicus, at the site of the previously described pain. The bowels were regular, and the appetite was fair. She had lost three pounds in weight. She was well developed, only fairly well nourished, and rather thin.

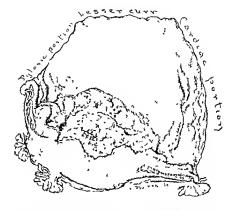
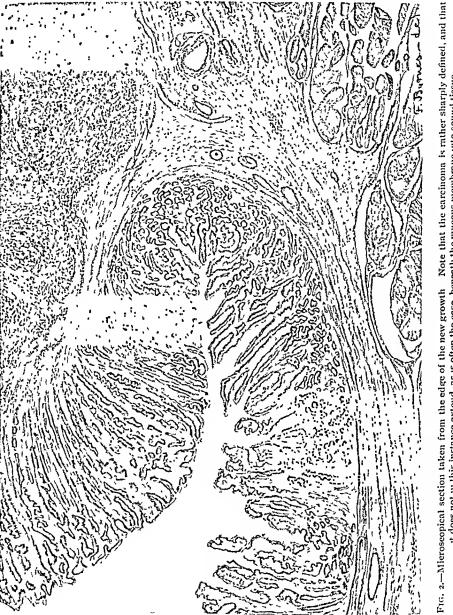


Fig. 1—Poster or wall of stomach. One half the port on of the stomach removed. Note the tumor cut in its in didle sixuation of tumor at greater curvature, morpial stomach upon et el er side of the tumor towards crud a and pyloros. Note where the growth was attached to the anterior at Astomania wall.

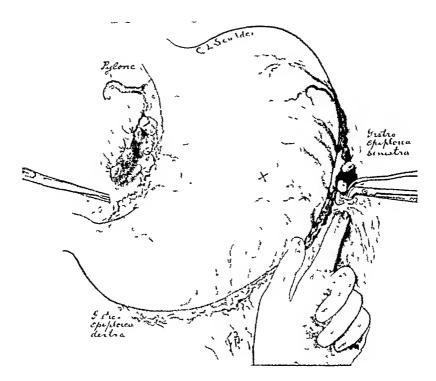
Carcinoma. Normal tissue.



it does not in this instance extend, as is often the ease, beneath the mucous membrane into sound lissue.



FG 3-Sho ng ste of nesso teth n small oma a du tural appear g abdon en



f ig 4—The technique of a partial gastrectomy. The pylorus is left in situ. The cross \times indicites the situation of the most anterior portion of the growth. Ligature of the gastrohepatic omentum and of the great omentum. Note blunt instrument tearing open gastrohepatic omentum preparatory to ligation. Note finger and Cleveland ligature carrier used in tying off great omentum.

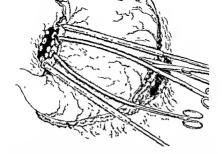


Fig. 5.—Partial gastrections. The omenta used off. R abber covered con pression clamps uplied to the most proximal and distal portions of the ston ach. Crushi is Jumps applied to the part of the stonach to be exclued. The section is made between boil pairs of clamps.

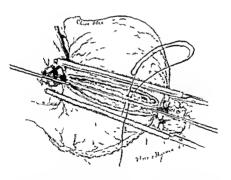


Fig 6—Partril gastrectomy The subber covered change serve to hold the two parts of the stomach approximated together, to prevent be morthage to prevent souling of the operation field by stomach fluid. Note Connect interrupted suture being placed. Note two long traction sutures.

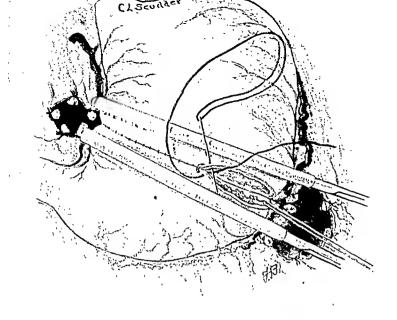


Fig. 7.—Partial gastrectomy. Note clamps and method of employment. Posterior wall completely sutured by Connell suture. Anterior wall partly sutured, one-half of a suture taken, remainder being taken.

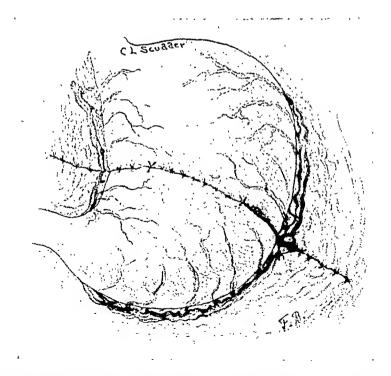


Fig. 8.—Partial gastrectomy. Completed operation. Omenta sutured. Note the four interrupted Lembert sutures to reinforce the Connell suture.

The skin and mucous membranes were pale. Many of the teeth were missing, and those remaining were carious and neglected Slightly enlarged glands existed in the neck and groin. To the left of the umbilicus was a rounded mass about four inches in diameter, slightly tender, hard, and smooth This mass was attached to the abdominal wall. It did not move with respiration and was not easily displaced The percussion note was dull over the mass Upon inflation of the colon, the dull area of the mass became a little more prominent. The liver extended from the sixth interspace to one inch below the costal margin. The spleen was palpable

July 1, 1904, the abdomen was opened The mass which had been felt was found to be slightly adherent to the anterior ab dominal parietes a little to the left of the median line. The peritoneum over the mass, from which it was with ease separated, was slightly edematous After separating the mass from the abdom inal parietes, the parietal peritoneum showed no loss of substance It was intact A slight induration existed in the parietes where the mass had been adherent. The omentum was slightly thickened and adherent to the mass This was separated The tumor was seated at the middle of the greater curvature of the stomach The tumor was entirely free and presented no other adhesions to the parts about. The stomach was withdrawn from the abdomen Gauze packing was placed about the stomach. The gastrohepatic omentum and the great omentum were ligated The stomach was double clamped upon both sides of the growth, the middle third of the stomach, including the largest portion of the lesser curvature, was removed, the divided surfaces of the stomach were united by means of an interrupted Connell mattress suture The suture line was reinforced by one or two interrupted Cushing sutures, a plastic of the omentum was placed both anteriorly and posteriorly to the suture line the parts were flushed thoroughly with normal salt solution, the walling off gauze was removed and the stomach returned to the abdomen The abdominal incision was closed with through and through silkworm gut sutures Except for a slight upset of the bowels, two weeks after the operation, the patient made a good recovery. The temperature did not rise above about 99° F. There was no shock from the operation, and the patient is now taking ordinary food with comfort and benefit The accompanying figures illustrate the technique and findings of this case

The feeding of this patient immediately after operation was as follows: She was fed for about one week upon nutrient enemata containing milk, three ounces; one egg; salt solution, one ounce. A nutrient enema was given every eight hours. Each morning a cleansing enema was used, to thoroughly wash the lower bowel. On the fourth day she was allowed water by mouth, on the ninth day liquids, and upon the tenth day soft solids.

Report of the Hospital Pathologist.—The specimen consisted of the middle portion of the stomach for its whole circumference. It was, after hardening, four centimetres on the lesser curvature, and on the mid-point nine centimetres in diameter. On opening, on the greater curvature was a rounded ulcer five centimetres in diameter, with raised indurated edges, and a rough, swollen base. On section, the base and borders of the ulcer were composed of hard, grayish, white tissue which had replaced the mucous membrane and the entire wall of the organ for a distance of five centimetres. At the edges the growth was continuous with the mucous membrane and did not tend to infiltrate the submucosa.

Three soft lymph nodes were also received. (a) Near the seat of the tumor; (b) from the mesocolon; (c) from the lesser omentum.

Microscopic Examination showed the base of the ulcer composed of solid masses of atypical epithelial cells separated by a small amount of fibrous tissue. These cells had infiltrated the walls of the stomach, extending through them to the peritoneum. They were of small size, closely packed together, with rounded nuclei, many of which were undergoing mitoses. The protoplasm was small in amount, and the outlines not sharply marked. Although the cells in most places were in solid masses, some showed glandular arrangement. The growth was everywhere infiltrated with round cells, and near the surface by large numbers of leucocytes. There was a good margin of normal tissue on each side between the edge of the ulcer and the cut edge of the specimen. Examination of the lymph nodes showed simple hyperplastic lymph adenoid tissue. Diagnosis, carcinoma.

(Signed) Channing Simmons, M.D.,

Assistant Surgical Pathologist.

[Note.—At present, April, 1905, some ten months after operation, this patient is in good health.]

SOME SURGICAL CONSIDERATIONS PERTAIN ING TO GASTRIC DILATATION.

BY A M POND, MD, OF WEBSTER CITY, 10WA

THE condition of gastric dilatation is so common and constant a feature of many diseases of the stomach, that it has really come to form quite a distinct position of its own, and one, it would seem, which demands special analysis and definition

There is a constant and fixed relation existing in the normal stomach between the gastric contents, the muscular ability of the stomach wall, and the resistance offered at the pylone ring, and it is quite obvious that any change in the elemental dynamics of digestion must lead to a consequential disturbance of function, and that disturbance is usually dilation, unless, perchance, there should exist a compensating hypertrophy in the musculature of the stomach, which, in spite of the resistance offered at the pylone ring, still main tains the proper relations and thus the secondary changes do not occur

The cause of all gastric dilatation should be sought. If the symptom be due to simple atony, or to the atrophic changes in the gastric muscle, the history may extend over a period of years. Quite in contrast to this statement, if the dilatation be due to some of the mechanical obstructions which are second ary to pathological changes at or near the pylorus, the history may not extend over many weeks or months.

The ethology of gastric dilatation, in general, may be said to arise from two very comprehensive sources. Mechanical forces, obstructing the outlet of stomach and thus increasing the resistance offered at the ring, and debilitating conditions occurring within the stomach wall, permitting an increase in the volume of stomach contents, which is more or less a

sequence to the inability to bring the contents to a level which permits duodenal drainage or evacuation.

The mechanical sources may be classed as extrinsic and intrinsic; or, causes arising from without and causes occurring within the stomach wall itself. The extrinsic causes may be due to tumors or to pathological conditions of adjacent tissue or organs. Tumors commonly causing pressure on the duodenum or pylorus sufficient to produce a stenosis or stricture may be an enlarged gall-bladder or a gall-bladder filled with calculi, a pancreatic cyst or tumor of the pancreas, omental tumors, growths of the liver, or enlargement of the retroperitoneal glands.

The pathological changes in the adjacent tissue capable of causing gastric dilatation may be a perigastritis which has proceeded from a cholecystitis, or empyema of the gall-bladder. The local peritonitis thus excited by some inflammatory condition of the gall-bladder forms bands of plastic exudate which involve the pyloric end of the stomach, in closest proximity, and which sometimes completely encircle the small end of the stomach in its contractures. This condition was noted twice in a series of thirty-six cases. In one case the provoking cause was simple cholecystitis; in the other, there were noted changes in the gall-bladder, and thirty-four small gall-stones were removed.

Prolapsed right kidney evidently has a very important rôle in gastric dilatation, but whether the dilatation is produced by the displacement of the kidney is at question. Suffice it to say, that the coincidence is far from rare in the observation of many writers.

Bartels was the first to discuss the relation existing between floating kidney and gastric dilatation, and assigned as a cause the production of a kink in the pylorus. My colleague, Dr. A. C. Delacroix, in an experience of fifty cases, found right prolapsed kidney in 25 per cent. of the cases, and prolapsed left and right kidney in 10 per cent. Litten has found this condition in 55 per cent. of his cases. These observations would lead to a belief that it was more than mere

coincidence, and that the descent of the kidney, from any cause whatever, might be associated with gastric dilatation, since it would hardly be probable that the primary dilatation could produce, or be a factor in the production of, malposition of the kidney

The Intrinsic Causes—By far the commonest cause of gastric dilatation arising within the wall of the stomach is a cicatrix of a corrosion or ulcer, in the event of the former, the cicatrix takes the form of hyperplasia or hypertrophy of the pyloric end of the stomach, or the ring, and is not surrounded by the evidence of so extensive inflammation as is found in the cicatrix of an ulcer, where the adhesions may be attached to the liver or parietal peritoneum without, as well as encroaching upon the lumen of the pylorus within Polypi may arise from the site of hyperplasia caused by erosion and may be of sufficient size to obstruct the canal

Spasm of the pylorus may occur for a long time after the healing of a pyloric ulcer, or after an ulcer occurring high in the duodenum, at or near the ring Such spasm is not, as a rule, continuous, but is extremely likely to be excited after a hearty meal, by the irritation of the passage of the gastric contents over the sensitive sear. When it does occur, it is quite sufficient to produce a lessening of the lumen, and a consequential sagging of the stomach wall

Carcinoma of the pylorus acts in a similar manner as de scribed in the cicatrices of corrosion and ulcer. There is a thickened wall lessening the outlet and demanding increased force of the musculature of the stomach to expel the stomach contents through the stenosed pyloric ring. This force is gradually lessened by reason of the lowered nutrition, and soon the stomach sags below a point of duodenal dramage.

There remains but one other condition under the head of causes arising from within and that is so rare that I mention it merely to complete the classification, i.e., congenital stenosis. This was first described by Williams in 1841, and since that time but forty cases are recorded.

The debilitating causes must be considered as atonic, or

conditions due to the temporary weakness of the gastric muscle, and atrophic, or causes arising from a pathological atrophy occurring in the muscle wall.

Atonic Causes.—These may be the result of a lowered general vitality, as in convalescence from a long-continued illness, excessive mental strain or worry, which, in turn, produces disturbance of the motor nerve fibres, and the muscle is not sufficiently stimulated by nerve energy to contract enough to empty the contents. The gastric juice has acted upon the meal, and a portion of it—the upper portion—has passed on into the intestines; however, the greater portion is left. The contractures of the stomach become weaker and weaker during digestion, and finally cease; the contents which have been acted upon by the gastric juice ferment; the fermentation produces gas; the gas dilates the stomach, dragging on the nerve endings and producing pain. There is mental dulness, and an occasional attack of severe headache as a result of the disturbed metabolism; further than this, the secretion of HCl is always greatly in excess, and is excited by the presence of this fermenting mass in the stomach.

The atrophic changes follow closely on the heels of the condition described above, and may be said to be produced secondary to long-continued atony where the atrophic changes have taken place as a sequence of a lack of proper nutrition; as a result of neurasthenia, where the motor impulse is impaired, and insufficient use of the muscle produces lowered activity and consequential atrophy; and, lastly, as a result of constant dragging or traction, as in the case of a prolapsed kidney, or a tumor of the lower abdomen, involving the gastrohepatic omentum, and drawn down by its adhesions.

Symptoms and Physical Findings.—Perhaps the most valuable symptom is pain. In the gastric dilatation from mechanical extrinsic sources, or from sources arising from without the stomach wall, the pain depends upon the location and character of the obstruction; for instance, if the obstruction be a large gall-bladder, or is due to perigastric adhesions or tumor of the pancreas, the pain would be an acute, tearing

pain, following shortly after a meal, and occurring during the contractures of digestion Again, if the obstruction is a tumor of the omentum or liver, or is due to enlarged retroperitoneal glands or prolapsed kidney, the pressure produces an artificial stenosis of the pylorus, and digestion is not com pleted In these conditions the pain is not acute, but is a dull. heavy, dragging pain, which, indeed, it is, as it is the fermen tation of the gastric contents retained by reason of the dis turbed dynamics-a stenosed orifice-which produces gas sufficient to dilate the stomach and drag on the peripheral nerve endings This pain is usually relieved by taking bland food, or sometimes even a drink of water, and it is in these conditions, in conjunction with the same symptoms following the disturbance of gastric tone, that the laity learn to use solutions of sodii bicarbonas, the alkali neutralizes the excess of HCl, and gas, in large quantities, is expelled, and the symptom of pain subsides or entirely disappears

The character of pain conspicuous in the intrinsic causes is more typical. In cicatrices of corrosions and ulcers, the pain is acute, short, and very severe. Fenwick states, in his "Résumé of 3679 Cases" (1904), that pain is frequent and severe where the walls of the curvature are the site. Growths of the cardiac end are least painful. Pain is greatest after meets.

meals

In the case of polypi arising near the ring, the pain would be more of the character described under extrinsic causes. In other words, it would produce a dull pain, due to the excessive dilatation of the stomach

Spasm of the pylorus is an acutely painful seizure, but can readily be recognized by the short duration, great seventy, and irregularity. In carcinoma, pain is early and, in most cases, is a continuous symptom, varying in severity according to its proximity to the pylorus. The first pain may be dull and oppressive, but later it becomes more acute, simulating the character of the uleer pain. Pain in the cases proceeding from debilitated muscle wall is, as a rule, due to the excessive fermentation induced by the inability of the musculature of the storach to evacuate its contents.

It will be observed, then, that the pain in gastric dilatation is sharply defined under two distinct heads. If it be acute, we think of ulcer, perigastric adhesions, gall-bladder encroachments, cicatrix of either ulcer or corrosion, spasm of the pylorus if irregular, and carcinoma. Such pain is increased by eating or drinking, as a rule.

If the pain be dull and dragging, and if it be relieved by taking bland food, or by sodii bicarbonas, we can assume that it is due to obstruction, either from pressure exerted from without, as, for example, tumors, prolapsed kidneys, etc., or it is a consequence of an incompetent muscle wall.

Vomiting is a most significant feature. It accompanies ulcer, stenosis (if severe), spasm, carcinoma, and the more intimately related extrinsic causes, as gall-bladder disease and perigastric adhesions.

In emphatic contrast, it is very rare that vomiting will occur in cases due to the impaired gastric wall. These patients will tell you that they never vomit. In a series of thirty-six cases, I have failed to get a history of involuntary vomiting in a single case, no matter how much they feel the need of it. They seem to find it impossible to empty the stomach by emesis. Consequently, you will find the majority of them using stomach-tubes, having been taught its use by their physician, or they drink large amounts of water, and provoke emesis by tickling the pharynx, or by irritation with the fingers.

The physical findings in gastric dilatation need only to be passed in review, since the ordinary methods of physical examination apply in these cases. Perhaps the commonest physical finding is a splashing on succussion. The symptom is constant, and is exaggerated relatively to the extent of dilatation; one precaution in regard to the reliability of this symptom is its absence after meals, for, as a rule, the relieved stomach rises to nearly its normal position, and the splashing will not be heard.

Quite naturally, the capacity of dilated stomachs is increased in exact ratio to the extent of possible laxity of the stomach wall.

The stomach may be filled with water or air, and then, by means of percussion and observation, its contour may be mapped out. If the patient is prone and the stomach well filled, the marked protuberance of the surface in the epigastric triangle will be noted, and, if water has been used, careful measurement of the contents siphoned after percussion will give the relative increase in size. An examination for pro lapsed kidney should be made in all cases in the course of the physical examination, and nephropexy should be included in the operative procedures for relief.

The uses of the Lockwood light, or Gastrodiaphane, was described by Kemp in April, 1904 His method is founded on a series of experiments, and is as follows Sodii bicarb grs xv-xx is dissolved in a glass (eight ounces) of water, the patient is given this solution in order to neutralize the acidity of the gastric contents. This is immediately followed by another glass (eight ounces) of water, in which are dissolved grs xv-xx sodn brearb and one eighth gr of fluo rescin The patient is then taken into a dark room and a Lock wood light, or Gastrodiaphane, is introduced in a manner similar to a common stomach tube, it is, however, much smaller, and can be manipulated without producing very much gagging or attempts at vomiting The light is very brilliant, and, contained as it is in a fluorescent medil, the entire stomach can be made out, the lower border located, tumors or hypertrophy of the pylorus identified, and tumors of the liver, the transverse colon, and the omentum covering the area of illu mination, can be detected. Kemp has also had excellent results from the use of quinine bisulph, grs x, dissolved in eight ounces of water, to which are added five minims of acid phos phoric dilute, and this is followed by another glass of water

The chemical and microscopical findings in gastric contents examination do not require any comment from me at this time, suffice it to say, that no stomach examination is complete without gastric contents examination

After all, the best and most satisfactory means of reaching a positive diagnosis is by exploratory laparotomy. This re-

veals the conditions as they are, eliminates all guesses, does away with all hypotheses, and leads the surgeon straight to the seat of the trouble, besides sparing the patient weeks, months, possibly years, of a semi-invalid existence, which he barely tolerates, and during which he is the constant object of the concern, sympathy, and solicitation of his friends and family.

Mere exploration will reveal the extrinsic causes of gastric dilatation, and the diagnostic exploration can be converted into curative operation without further inconvenience or delay. The tumors encroaching upon the duodenum or pylorus may be removed, the perigastric adhesions separated, the cicatrices of corrosions or ulcers palpated, a polypus identified, carcinoma recognized, and surgical procedures undertaken which will most nearly restore the function of the part to normal. Should it be impossible to remove the encroaching tumor, the operation of gastro-enterostomy is clearly indicated. Whether by suture, Murphy button, McGraw ligature, anterior or posterior operation, these important details must be decided according to indications and operative selection.

In stricture or stenosis of the pylorus, proceeding from corrosion or hyperplasia, the operation of pyloric dilatation is to be attempted. This can be done, sometimes, by invagination through the wall of the stomach as practised by Hahn. Loreta made an operation known as "Pylorodiosis," in which he dilated the pylorus ring through an incision on the anterior wall of the stomach. The dilatation was accomplished by stretching with the fingers, and, while apparently a simple procedure, was followed by a mortality rate that would hardly commend it to the conservative surgeon.

Pyloroplasty was originated for the same class of cases. The simple, perpendicular incision, and the longitudinal suture of the same, was modified by Mayo Robinson introducing a bone bobbin into the lumen of the ring.

Unquestionably, the operation of choice in this condition is gastro-enterostomy, unless sufficient dilatation can be had by invagination. Gastro-enterostomy, or Finney's operation of gastroduodenostomy, is equally as well suited in cases of cicatrices of corrosion or ulcer, providing the cicatrix is on the anterior surface of the stomach. Where the cicatrix is found at or near the pylorus, gastro-enterostomy is to be preferred Pylorectomy, or partial gasterectomy, is obviously indicated in carcinoma where the growth occurs at or near the pyloric end

In meeting the requirements for restoration of impaired function due to atony or atrophic changes in the muscularis. the simplest procedure that promises the greatest restoration, and at the same time does not in any way endanger the patient, is, perhaps, gastroplication. The greatest objection to this operation in the past has been the fact that it leaves the mucosa either in rugea or one large fold, which gives opportunity for the retention of fermenting contents of the stomach, thus pro ducing a recurrence of the symptom. In the last three cases of gastric dilatation due to the impaired stomach wall, the writer has modified the standard operation, which procedure overcomes these objections. Sufficient time, however, has not elapsed to warrant a description of the operation The last case was operated June 4 In each instance very satisfactory results have followed The success of the operation, however, is dependent upon two very important factors, i.e. patency of the pyloric orifice, and the ability of the gastric muscle to regain its normal tone

GUNSHOT WOUND OF THE PANCREAS.

REPORT OF CASE, AND REVIEW OF LITERATURE.

BY F. GREGORY CONNELL, M.D.,

OF SALIDA, COLORADO,

Attending Surgeon, Denver and Rio Grande Railroad Hospital; Consulting Surgeon, St. Vincent's Hospital, Leadville.

Synopsis of Case.—T. R., aged twenty-one years, an American, miner, was shot in the abdomen, during a struggle for the possession of a .32-caliber revolver, at about 4 P.M., on December 13, 1901. He arrived at St. Vincent's Hospital, Leadville, two hours after the accident. Examination revealed a gunshot wound on the right side, midway between the axillary and mammillary lines, at about the seventh costal cartilage. Pulse, 100; temperature, 99° F., and respirations, 20.

He complained of intense colicky pain in the abdomen, chiefly in the region of the umbilicus. The entire abdomen was tender, but this was most pronounced above the umbilicus in the median line. There was present no distention, no marked rigidity of the abdominal muscles, the liver dulness was normal, and no evidence of fluid in the abdominal cavity. The patient was very restless, and continually rolled from side to side, crying for something to relieve the pain. During the examination, he vomited for the first time, and fresh red blood was found with the vomited matter. Laparotomy was performed one hour after admission to the hospital, three hours after the injury. Dr. J. A. Jeannotte assisted, and the late Dr. R. J. Gregerson administered the anæsthetic.

Exploration disclosed a through-and-through wound of the right lobe of the liver and a perforating wound of the stomach at its lesser curvature. These wounds were closed by suture, the through-and-through suture of the stomach wall was re-enforced by a suture of the lesser omentum. Examination of the large and small gut, the kidney, and the spleen was negative. The abdomen was then closed without irrigation or drainage. Recovery from the anæsthetic and the shock of the operation was satisfactory.

The next day, the 14th, the highest temperature was 1012° F, pulse 120 to 130, and the respirations from 16 to 20. There was quite a little nausea, some vomiting, but no hematemests, slept for a short time at frequent intervals. The condition on the 15th was similar to that of the previous day in all respects, the pulse was never below 120, and the temperature was 102° F, at the highest, in the afternoon. There was no vomiting nor nausea, and the rectal enemata were well retained. During the night restlessness gradually became marked the pulse very rapid, and the temperature in the rectum went up to 102° F, respirations were about 30, he became unconscious and was in a muttering delirium. Physical examination of the abdomen was negative, there was no evidence of peritorius, nor of hæmorrhage. The temperature became subnormal before death, which took place at about 3.4 M on the 16th, sixty hours after the shooting

Partial autonsy, six hours after death. No signs of pentonitis Upon separating the gastrohepatic omentum where it had been sutured over the wound of the stomach the stitches of the stomach wound were plainly visible, and for one eighth of an inch on each side of this line of suture the stomach wall was of a dark, slaty color, in marked contrast to the shiny peritoneum elsewhere In the centre of the sulcus there was a thin layer of thick, viscid, grumous, slate colored material. There was positively no attempt at union between the apposed serous surfaces of the stomach wall, but there had been no leakage of stomach contents, because the sutures held the inverted margins in position There was a small amount of serosanguinolent fluid in the lesser peritoneal sac. The pancreas was badly damaged by the passage of the bullet, the track of which was plainly visible to the left of the middle of the body of the organ The lining of this opening through the pancreas was dark in color, soft, and necrotic, sur rounding this narrow zone of necrosis the pancreatic tissue was hard and mottled with red The bullet was removed from the retroperitoneal tissues to the left of the second lumbar vertebra There was no necrosis of the tissues that surrounded the bullet The wounds of the liver were normal as was also the laparotomy incision (Figs 1 and 2)

This case is instructive from more than one point of view, for instance A. The failure to detect a serious lesion of an

important organ intimately associated with the injured viscera. B. The condition of the stomach wound. C. The treatment.

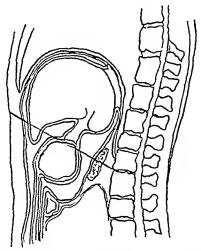


Fig. 1.—Anterior posterior direction of bullet track.

A. As to the frequency with which this oversight has taken place, we may quote from Mikulicz: "We often find cases reported where wounds of the stomach or intestine having

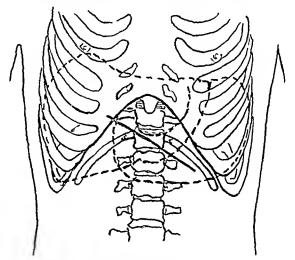


Fig. 2.-Lateral obliquity of bullet track.

been sutured, death has occurred from an undetected wound of the pancreas."

As to why this should be true, there are a number of explanations which might be advanced, such as:

- (a) The prevailing opinion that the pancreas is rarely, if ever, injured, and that, if so, the wound is almost invariably fatal Boeckel, for example, in discussing Ceccherelli's paper at the International Congress of Medicine in 1900, said, "Les blessures du pancréas sont generalement mortelles d'emblée" And Michaux, in the same discussion, concludes, "Que les ruptures du pancreas sont au dessus des ressources de l'art "And from the Philadelphia Medical Journal, in an editorial, "Wound of the pancreas which is usually immediately fatal"
- (b) Without doubt, Mikulicz 5 explains a very frequent cause in saying, "When the abdomen is opened in such cases, the accompanying injuries of the surrounding parts almost always demand such attention that the lesion of the pancreas is easily overlooked."
- (c) But perhaps the most important cause is the ana tomical position of the organ and the consequent difficulty of a thorough examination

All of these points tend towards a neglect of this organ in cases of traumatism of the upper abdomen

There are five routes mentioned by Park by means of which the pancreas may be approached, of these, three may be applicable for examination, ie, (1) above the stomach through the lesser or gastrohepatic omentum, (2) below the stomach, through the greater or gastrocolic omentum, (3) belind the stomach and colon, through the transverse mesocolon

B Condition of the stomach wound Non union of ap proximated serious surfaces may be due to various causative factors, but when this condition is found in conjunction with a wound of the pancreas it does seem rational to assume that the non-union has been caused, in part at least, by the action of the pancreatic juice upon the tissues at the site of the imperfect healing. The properties of the pancreatic juice, in some particulars, are still more or less obscure. While its action upon food substances within the intestinal canal is well recognized and definite, its action upon different structures of the living body is still more or less vague and indistinct. We

may consider its action upon (1) epidermis, (2) deeper structure, (3) granulation tissue, (4) peritoneum.

- r. The effect of the pancreatic juice upon the skin has been noted in many cases of high intestinal fistulæ, in drained pancreatic cysts, and, experimentally, in pancreatic fistulæ. Almost invariably with all of these conditions there results an irritation, and, finally, a destruction of the epidermis, which is in prolonged contact with the fluid discharged from the fistulous opening. This effect is supposed to be due to the digestive action of the pancreatic juice.
- 2. The digestion is confined to the superficial layers of the skin, the epidermis alone is destroyed in this manner, the destruction of cells does not extend deeply but peripherally. The cutis vera and the subcutaneous structures seem to be able to resist the digestive action of the pancreatic juice. The deeper structures may show signs of irritation or of inflammation, but whether this is due to the irritation of the pancreatic juice, or an irritation subsequent to a deprivation of its normal covering, the epidermis, cannot be definitely stated; but these underlying structures are not digested and removed as are the cells of the cuticle.
- 3. Granulation tissue is usually formed after the superficial layers have been removed; and it has been found that the cells of this tissue are able to withstand the presence and the action of the escaped pancreatic juice. One explanation for this difference in behavior of the pancreatic secretion on the epidermis and upon the true skin and granulation tissue may be found in a possible absorption of the digestive juice by the vascular tissues after the superficial layers have been removed. Or perhaps a better in a theory advanced by H. W. Cushing, of Boston, to the effect that the epidermis is composed of cells with practically no vitality, hence the digestion, which is not possible in living, vascular, deeper cells, peritoneum, or granulation tissue.
- 4. On account of the marked effect of the pancreatic juice upon the skin, it was naturally to be supposed that this same fluid would cause a reaction greater, or at least equal,

upon the much more sensitive peritoneum. But early in the era of pancreatic experimentation, Claude Bernard 8 in 1855, found that when the pancreatic juice escaped into the peritoneal cavity there was practically no peritonitis as a result

Heidenhain subsequently confirmed this observation, and is quoted by Senn as follows The animals do not suffer from this circumstance, as the duct is regenerated in spite of the wounded surface being bathed in the secretion. Never theless, it is difficult to explain this. Why do not the wounded and suppurating tissues undergo digestion by the pancreatic juices. And Senn, in m. 1886, also verified these findings.

After the experimental establishment of internal pan creatic fistulae, he concluded that, 'Extravasation of fresh normal pancreatic juice into the peritoneal cavity does not produce peritonitis, but is promptly removed by absorption". In 1888, Martinotti, 1 after the experimental removal of the pancreas, arrived at the same conclusion. And in 1897 Flex ner 12 said, "The secretion of the pancreas may enter the peritoneal cavity without setting up a diffuse inflammation."

Cushing, 18 in 1898, said, "It is liard to understand why

Cushing,¹⁸ in 1898, said, "It is liard to understand why the fluid digests epidermis and not granulation tissue or peritoneum."

Ceccherelli, 14 in 1900, said, relative to this point, that his experience was in accord with that of Senn and Martinotti. He further stated that the pancreatic juice cannot cause per tonitis if it is pure, as it is rapidly absorbed. But if altered it may produce septic phenomena.

In 1903, at the Congress of American Physicians and Surgeons, Mikulicz 16 said, "The point as to whether or not this leakage is injurious was only recently definitely settled After the experiments and experiences of recent years, we can no longer doubt that such leakage is indeed harmful The experimental studies of Wilhams, Flexner, Biondi, Katz and Winkler, and others, show clearly that injuries of the pancreas, through which the vitality of a part of the organ is impaired, and the flow of pancreatic juice towards the pancreatic duct is hindered or ceases entirely, seriously affect the peritoneum

and the neighboring tissues."... "If we ask ourselves whether the secretion from the injured pancreas leaking into the abdominal cavity can of itself so damage the peritoneum that death from this cause alone may result, we must surely admit that this is a possibility, as shown by a number of experiments and clinical observations of accidental injuries in man."... "It seems, moreover, that the secretion from the injured or also inflamed pancreas without bacterial invasion can cause a variety of aseptic peritonitis."... "Blood and pancreatic secretion ooze into the peritoneal cavity, preventing the formation of peritoneal adhesions."

The above is quoted at length, for it is a statement of the generally accepted facts to-day, and was stated by, perhaps, the foremost authority upon the subject at this time, before the representative physicians and surgeons of America. And while directly opposite to the previous teachings, it is what might be expected from a theoretical stand-point.

The condition of the stomach wall in the case under consideration may possibly be explained, in the light of the most recent investigations, somewhat as follows:

That the pancreatic fluid escaped into the peritoneal cavity cannot be doubted. Its presence did not cause a general peritonitis. The site of the gastrorrhaphy and the lining of the track of the bullet through the pancreas were superficially necrotic. There must have been some reason why this localized necrosis took place while the rest of the abdominal cavity remained practically normal.

The location of these destructive changes would lead to the belief that possibly the digestive juices of the stomach or intestine might have acted as predisposing or aiding factors. The pancreatic juice must have passed over, and had no appreciable effect upon, a large portion of the serous covering of the stomach. No destructive action was noted till the site of the perforation was reached; at this point the gastric juice and the fluid from the injured pancreas might have combined with a resulting destruction of tissue. The suture of the lesser omentum over the stitches in the stomach proper seems to have been no protection.

The necrosis along the path of the bullet in the pancreas is not so difficult to explain. The altered pancreatic juice and blood alone might have been able to produce the change, or infective matter, or stimulants to the pancreatic ferments, might easily have ascended to the wound by means of the common duct and the duct of Wirsung. The fact that the cavity in which the bullet rested was not necrotic might be explained by the presence of some obstruction in the track which prevented the fluid from gravitating into this final lodgement of the missile. The normal condition of the wounds of the liver and that of the abdominal wail may be explained by the dorsal position of the patient and the lack of contact with the fluid from the injured pancreas.

On the other hand, it may be that the intestinal or gastric secretions had nothing whatever to do with the change, and that the mere suturing, or the passage of the bullet, caused sufficient trauma to prevent the tissues from resisting or coun teracting the action from the damaged pancreas. In 1898, Williams 16 suspected that the pancreatic juice may be possessed of irritating properties which make the tissues in contact with it extremely hable to infection. And Mikulica 13 said, "But if the vitality of the peritoneum has been impaired by the action of the pancreatic secretion, then a limited number of bacteria are sufficient to cause peritonitis."

In an attempt to study this question, the writer made various experiments on dogs, in which, to the establishment of an internal pancreatic fistula, there was added traumatism of the adjacent peritoneum, and in some instances the endothelial layer was entirely removed. But in none of these cases was there any apparent effect of the puncreatic juice upon the injured or denuded areas. In others the pancreas was injured, so that, without doubt, its secretion escaped into the peritoneum, and then a suture, or rather a seton was passed into the lumen of the adjoining stomach or diodenum and tied with a large knot in the peritoneal cavity. The results were various, but in no case was there any localized peritonitis or gangrene comparable to that in the case reported

Popelsky ¹⁸ has proved to his satisfaction that the pancreatic juice alone cannot digest proteids; but when brought in contact with intestinal secretion, however, its protypdin is converted into trypsin, and the latter successfully attacks proteids. This would seem to be questionable when it is remembered that the fluid from a retention cyst of the pancreas, which certainly does not communicate with the duodenum, when drained has been known to digest the epidermis of the skin adjacent to its place of exit.

Pawlow ¹⁹ discovered a new enzyme in the gastric secretion, a specific ferment called "chymaze," which does not digest food, but which accelerates the action of the ferments of the pancreatic secretion.

Pawlow and Chepowalinkoff ²⁰ have shown that the pancreatic activity may be increased by the addition of an extract of intestinal mucosa or succus entericus. This is accomplished by a body called "enterokinase." The terms enterokinase and chymaze seem to be used interchangeably in the literature. It may have been the presence of this chymaze or enterokinase at the wounds that stimulated the pancreatic secretion to a greater activity which caused the necrosis; and its absence from the adjacent peritoneum may account for the lack of action by the same fluid.

C. Treatment. The most important element in the treatment is the finding of the condition. And in order that it may not be overlooked, it must be borne in mind that the pancreas may possibly be damaged in each and every case of injury of the upper abdomen. Examination with such a possibility in mind will but rarely fail to detect the lesion, if present. When a lesion of the pancreas is found in a case of gunshot wound, the treatment will consist of suture or drainage.

Suture alone has but little in favor of it, on account of the deep position of the organ; sutures are properly placed only with great difficulty; the structure of the pancreas is not suitable for the holding of stitches, and even with careful suturing the coaptation is apt to be faulty, with a consequent leakage.

On the clinical side there is recorded but one case in which this line of treatment, ie, suture alone, was employed. And this made an uneventful recovery. When suture of the dam aged viscus is possible and practicable, without prolonging the operation too long, it should be done, and the drain brought to the site of the suture.

Drainage has been employed in the great majority of these cases, and it is a noteworthy fact that in the two instances where a localized destruction of tissue occurred drain are was not instituted

Leakage of fluid from the damaged organ is almost certain to occur, either into the retroperitoneal structures or into the free peritoneal cavity. And as it is certain that this fluid will do less harm outside of the body than in either of these locations, it is therefore advisable to drain each and every case, and even in suspected cases, if the condition of the pancreas has not been definitely determined upon. Tubular and gauze drains have each been employed, but the best drainage is un doubtedly obtained by a combination of gauze and a tube.

In all of the reported cases except Jepson's the drainage has been effected through the anterior abdominal wound, but as a much more perfect drainage can be maintained by means of a posterior opening (R Park.). It is therefore to be recommended as an additional safeguard in all cases of pancreatic mijury. Case XVIII (Jepson) must be looked upon as a model for treatment of guishot wound of pancreas.

The following cases are all that have been reported in available literature to date, and for fifteen of these we are indebted to the very able article by Borchardt ²²

CASE I—Oris Medical and Surgical History of War of the Rebellion, Part II, Vol ir page 159 Wound of entrance, ax inches to the left of the spinal column below the eighth rib Wound of ext, none Symptoms pulse good slightly irritable. No marked symptoms for two weeks, tien hemorrhage from the wound with hematura repeated Re suit death one month after the receipt of the injury Course of the bullet spleen and pancreas

Case II—Into Wound of entrance one line to the left and below ensiform. Wound of exit just above the crest of the illum. Symptoms

pulse quick and feeble, abdomen distended and tympanitic. Result, while feeling much better, death occurred suddenly on the fifteenth day. Course of bullet, inferior curvature of the stomach, about the middle of the pancreas. Omentum was in a state of partial decomposition, with general peritonitis.

CASE III.—Otts. Wound of entrance, below spine of left scapula, an inch from shoulder-joint. Wound of exit, none. Symptoms, emphysema, pronounced jaundice on eighth day. On the ninth day, profuse hæmorrhage from the nose and mouth. Pulse weak and thready. Result, death on twelfth day. Course of bullet, scapula, fifth rib, left lung, lower lobe, diaphragm, liver, left lobe, and pancreas.

CASE IV.—Sanitas. Report of German Army in War, 1870–1871. Wound of entrance, left of body of eighth vertebra. Wound of exit, left of navel. Symptoms, coughing of blood, suppuration of the posterior wound. Result, death on the twenty-fifth day. Course of bullet, fracture of the eighth rib, spleen, and pancreas.

Case V.—Niemann, Mayer. Wound of entrance, beneath ensiform process. Wound of exit, between second and third false ribs near vertebra. Result, immediate death. Course of bullet, heart, diaphragm, liver, and pancreas.

CASE VI.—BERTRAM. Inaug. Diss., Jena, 1893. Wound of entrance, first, between navel and ensiform; second, sixth intercostal space, left mammillary line. Wound of exit, none. Symptoms, hæmatemesis, hæmoptysis, hæmaturia, collapse. Result, death. Course of bullet, first, stomach and head of the pancreas; second, diaphragm, twelfth rib, spleen, and left kidney.

Case VII.—Von Bramann, Weimuth. Archiv f. klin. Chir., Vol. lx, 1899, 1900, page 482. Wound of entrance, under angle of left eleventh rib. Wound of exit, none. Symptoms, brought to hospital three hours after injury; general findings good. Six hours later, hæmatemesis twice. Operation, nine hours after injury. Course of bullet, through stomach, mucous membrane prolapsed, bullet found in pancreas. No stomach contents in abdomen, but a teaspoonful of blood. Treatment, suture of stomach wound, site of suture tamponed, wound of pancreas likewise tamponed. Result, recovery.

CASE VIII.—IBID. Wound of entrance, under costal arch midway between sternum and left mammillary line. Wound of exit, none. Symptoms, brought to hospital six hours after injury, one-half hour later hæmatemesis. Operation, eight hours after accident. Course of bullet, through the stomach and into the pancreas. Some stomach contents in abdominal cavity. Treatment, suture of the stomach wound, surrounding the same with gauze. Pancreatic injury also packed with gauze. Result, recovery.

Case IX.—E. Hahn. Deut. Zeit. f. Chir., Band lviii, 1900, 1901. Wound of entrance, left of median line at the height of the seventh and eighth costal cartilage. Wound of exit, bullet found under the skin, at about a level with the left kidney. Symptoms, pulse small and rapid; belching of gas but no vomiting; marked anæmia and prostration; dul-

ness in the left half of the abdomen. Operation, lagarotomy for hamorhage shortly after admission, which was one half hour after accident. Course of bullet, through left lobe of fiver, through lesser omentum, through the transverse mesocolon into pancreas, stomach uninjured. Treatment, cleaming of the persional cavity, and packing the track of the bullet with gauze. One strip of gauze in the anterior wound of the liver, a sturd in the opening of a second in the posterior wound of the liver, a third in the opening of the gastrohepatic omentium, and another in the opening of the mesocolon and into the retroperstional effusion of blood. Result, recovery

CASE X—G. NYN. Cent. f. Chur., No. 41, 1901, page 1024. Wound of extrance, right of second lumbar vertebra. Wound of extr., right epigas tric region, between mammillary and parasternal lines. Symptoms, ran 500 yards after the receipt of injury. Brought to hospital collapsed almost unconscious, pulse thready, abdomen painful and tympanitic. Operation opening of the peritoneum was followed by the escape of blood and gas, eight wounds of gut were sutured. In making totler, found blood oozing from between the stomach and the transverse colon, a transverse incision from imbliciums to the right azullary line, and tearing through the gastro colic omentum, revealed a wound of the pancreas at the junction of its head and body. Course of bullet, pancreas, six wounds of small intestine one wound of hepatic flexure of colon. Treatment, two deep sutures of

the pancreas, no drainage. Result, recovery

CASE XI—M BORCHARDT Berl kin Woch., January, 1904, No 3

Wound of entrance, epigastrum, left of median line. Wound of exit, none. Symptoms, extreme nervousness, marked pallor, pulie good, your noted blood. Operation, four and one-half hours after accident, upon opening the perstoneum, blood shot out, and the pulse disappeared. Course of bullet, left lobe of liver, portal yent, tail of the pancreas, yens henalis were torn and bleeding. Treatment, suture and drainage (gaure packing). Result, recovery.

Case XII—Vor Bramann, Weisium Ind. Wound of entrance one centimetre to the left of the end of the ensiorm cartilage Wound of exu, none. Symptoms, one half hour after the accident, romited three times, no blood, came to the climic next morning. Pattent strong but small. Slight tympanities, duliess over the left lobe of the lung with some dyspacea. Duliness likewise in the epigastrum and the left hypochondrium. During the last few hours before operation postoperative symptoms. Death occurred on the minh day. Autopsy laparotomy, twenty hours after the accident. Liver bleeding freely about one and one-half littees of blood in pelvis. Gastro-intestinal canal nega tive. Course of bullet, through liver and lesser omentum, and disappeared in the body of the paircers. Treatment, wounds of liver and pancreas tamponed with indoform ganze. Result, death thirty three hours after mintry.

Case XIII—M SIMMONDS Mun med Woch, 1898, No 6, page 169. Wounds of entrance and exit not given Symptoms, those of inter nal, peritoneal, hiemorrhage Operation laparotomy two hours after the injuny. The source of the bleeding was not discovered and, as it stopped

spontaneously, the abdomen was closed. Result, patient went into collapse, and died thirty-six hours after the operation. Course of the bullet, as shown by the autopsy, was through the pancreas; the vena lienalis were opened. Fat necrosis was noted.

Case XIV.—Mann and Mynter. American Medicine, October 19, 1901. Wound of entrance, midway on a line from left nipple to umbilicus. Wound of exit, none. Symptoms, pulse getting weaker, with a perforating wound of the peritoneal cavity. Operation, one and one-half hours after the injury. Course of bullet, anterior wall of stomach, posterior wall of same; palpation of the deeper structures behind the stomach revealed no trace of the bullet or its track. Treatment, both wounds of the stomach were sutured and the abdomen closed without drainage. Result, with the exception of a gradually weakening pulse, there were no marked postoperative symptoms. Death occurred on the ninth day. Autopsy revealed additional injuries to the pancreas and left kidney, also extensive necrosis of the pancreas and the gastric wall in the neighborhood of both wounds.

Case XV.—Korte. Verhand. der Freien Chir., Verein, Band xiii, p. 87. Wound of entrance, below the costal arch, to the right of the middle line. Wound of exit, none. Operation, laparotomy, eight hours after the injury; much blood and intestinal contents in the abdominal cavity. Course of bullet, through the colon, the mesocolon, into the head of the pancreas; a loop of the small intestine was shot through in many places. Treatment, resection of the small intestine was necessary. Result, death a few hours later. Autopsy, fat necrosis was present.

CASE XVI.—K. G. SLAVSKY. Roussky Vratch, July 31, 1904, Abstract. New York and Philadelphia Medical Journal, September 17, 1904, page 565. Wounds of entrance and exit not given. Symptoms, intense shooting pain in legs and thighs, showing involvement of lumbar plexus. Operation, laparotomy five hours later. Course of bullet, through liver, stomach, lesser omentum, and pancreas. Bullet was not found. Treatment, wounds carefully closed with Lembert sutures (drainage not mentioned in abstract). Result, recovery.

Case XVII.—Connell. (Case reported in this article.) Wound of entrance, below the fourth costal cartilage, right side. Wound of exit, absent. Symptoms, two hours after accident, pulse, 100; temperature, 99° F., and respiration, 20. Complained of intense colicky pains in the region of the umbilicus. Very restless; hæmatemesis. Operation, laparotomy three hours after injury. Course of bullet, through liver, through stomach at the lesser curvature, farther course not found. Treatment, suture of the stomach wound, and suture of the lesser omentum over the line of union. Liver wounds packed and then sutured. Abdomen closed without drainage. Result, death sixty hours after accident. Autopsy showed wound of the pancreas a little to the left of the middle; track of bullet through pancreas necrotic; site of suture of the stomach likewise necrotic; liver and abdominal wounds normal; no peritonitis.

CASE XVIII.—W. JEPSON. Personal communication. Wound of entrance, left fifth intercostal space, one and one-half inches from costal margin. Wound of exit, none, but bullet could be palpated above crest

of thum at outer side of quadratus lumborum muscle. Symptoms, was seen by operator seven hours after accident. Shock not marked, child walked upstairs after the injury Vointed blood and mucus, stomach was empty Temperature, 97 4° F. pulse, 108, respirations, 24 Pain not extreme. Operation, nine hours after receipt of injury Incision in left linea semilinaris extending four muches from costal margin, this was total by a transverse incision three inches long into the illocostal space Course of bullet, through disphragm, anterior, superior, and poste rior inferior walls of the stomach, mesocolon, and pancreas. It was thought that the duct of the latter organ was not insured. Treat ment, diaphragm closed, both wounds of stomach closed by double purse string sutures Pancreas sutured with fine silk, drainage tube fastened with cateut at site of panercatic sutures, this tube was brought out nos teriorly after incising the skin and dilating the track of the bullet, the tube was surrounded with gauge. The omentum was attached by catgut at the site of the suturing. The posterior gastric wound and the superior wound of the pancreas were provided for by a cigarette drain, after the peritoneal toilet was completed, this drain was brought out below the ribs at the outer border of the left quadratus lumborum muscle. The interior abdominal wound was closed without drainage. Result recovery

Case XIX -- Orrs Ibid (Mikulicz, in his address before the American Congress of Physicians and Surgeons, mentions one case of recovery after operation for gunshot wound of the pancreas which he eredits to Ous After searching the literature on the subject, this is the only one that I have been able to find that might be the case. It is in serted last, as its belonging with the other eases might be rationally ques tioned. The case is as follows.) Wound of entrance, right side below ribs Wound of exit on the left side. Two days after miury while straining at stool, a hernia of the pancreas, size of hen's egg presented No special symptoms supervened Operation, silver wire passed around the pedicle and tightened every day for a week till it became very small and was then snipped off with seissors Result, left hosnital in a month and was still well two months after

Since the above was written the following case has been noted

CASE XX -A BECKER (Zent f Chir, 1905 No 5) Wound of entrance, between eighth and ninth left costal cartilage. Wound of exit not mentioned. Operation, laparotomy, one hour after many, disclosed a grazing wound of the stomach without perforation into the lumen of this viscus A large hole in the tail of the pancreas The pleura was torn Treatment, suture and gauze nacking Result, recovery, with pancreatic fistula, which finally closed

In reviewing these cases there will be found 20 cases with II deaths and o recoveries. 6 cases not operated upon, 6 died Considering No XIX as a non-operative case leaves 7 nonoperative cases, with 6 deaths and 1 recovery, 12 operated cases with 5 deaths and 7 recoveries. In three of these 12 cases the injury of the pancreas was unsuspected or not found, all of which resulted fatally, leaving 9 cases operated for gunshot wound of the pancreas, of which 2 died and 7 recovered.

As to the operative procedure.

In 7 cases no operation was performed, of which 6 died and 1 recovered.

In 3 cases laparotomy was performed, but nothing was done to the pancreas; abdomen was not drained, 3 died.

Drainage of the pancreas, 4 times, 1 died and 3 recovered.

Suture of the pancreas, no drainage, in I case with I recovery; with drainage, 3 times, with 3 recoveries; with drainage not mentioned, I with a recovery.

As regards the other viscera injured there were:

Stomach, 8 times with 4 recoveries and 4 deaths.

Liver, 7 times with 3 recoveries and 4 deaths.

Lesser omentum, 4 times with 2 recoveries and 2 deaths.

(In two instances was the lesser omentum injured without injury to the stomach.)

Diaphragm, 3 times with 1 recovery and 2 deaths.

Spleen, 2 times with no recoveries and 2 deaths.

Small intestine, 2 times with 1 recovery and 1 death.

Large intestine, 2 times with I recovery and I death.

Lung, I time with no recoveries and I death.

Kidney, I time with no recoveries and I death.

Heart, I time with no recovery and I death.

Portal vein, I time with I recovery and no death.

Fat necrosis was noted on only two occasions at autopsy, and not at all at the time of the operation.

Death occurred at variable times after the receipt of the injury.

In the 6 non-operated cases, 30 days, 15 days, 12 days, 25 days, immediately, immediately.

In the 5 deaths following operation:

Operation 20 hours after the accident, with death occurring 33 hours after the injury; 2 hours after accident, death

38 hours after. 11/2 hours after accident death on the ninth day. 8 hours after accident, death a few hours later, 3 hours after accident, death 60 hours after

In the 7 recoveries after operation, the operation was per formed o 8, I, unknown, 41/2, 5 9 hours after the mury

The wound of entrance in 6 cases was in the posterior abdominal wall, and in the other 13 it was in the anterior wall A resume of the symptoms in these 20 cases leads to the

conclusion that there are no pathognomonic, or even suggestive, symptoms of injury of the pancreas in gunshot wounds of the abdomen The probable course of the bullet is the chief guide In wounds of the lesser omentum and the posterior wall of the stomach especially, injury of the pancreas must be excluded before the abdomen is closed

BIBLIOGRAPHY

- Mikuliez Transactions of Congress of American Physicians and Sur geons 1903 page 63
- Boeckel Report of MII Cong Internat de Med et de Chir Rev de Gyn et de Chir Abd April 1900
- Michaux Ibid
- Philadelphia Medical Journal September 14 1001
- Mikulicz L e page 56 Park Medical News March 15 1902
- Cushing Annals of Surgery Vol xxviii 1898 page 512
- Bernard Leçons de Phys Appliq a la Medecin 1855 Paris
- Senn Surgery of the Panereas page 53
- Senn Ibid page 128 "Martinotti Giorn Della R. Acad d Medicine 1888 No 7
- ¹Flexner Journal Experimental Medicine 1897 Vol 11
- "Cushing L. c.
- Ceccherelli Rev de Gyn et de Chir Abd April 1900 Mikulicz L e pages 58 59 60
- Williams Journal Experimental Medicine 1898 Vol 10
- Mikul cz L e page 60
- Popelsky Roussky Vratch April 19 1903 American Med cine July 5 1903 page 161
- "Hemmeter Progressive Medicine December 1903
- Borissof International Clinics Vol 11 17th Series
- " Park. Annals of Surgery August 1902
- Borchardt Berliner klin Woch January 1904 Nos 3 and 4

HYDROCELE IN THE FEMALE.1

BY ALBERT E. HALSTEAD, M.D., AND CHARLES P. CLARK, M.D., OF CHICAGO.

MRS. R. H., colored, forty-two years of age, was admitted to St. Luke's Hospital, October 31, 1904.

The family history was negative. The patient, besides the ordinary diseases of childhood, had suffered an attack of malaria six years previous, and of appendicitis one year later.

Her menstrual periods, until recently, were regular and accompanied by some pain. Of late the patient has had many uterine hæmorrhages, persisting from four days to a week, during which large clots of blood were passed. The patient has had three normal pregnancies.

The condition for which the patient sought admission to the hospital was a mass in the right inguinal region. This growth appeared eighteen years ago, subsequent to the birth of the second child. The patient stated that the mass had always been reducible, but that it would reappear in four or five days after reduction. Eight days previous to admission the mass would no longer disappear on pressure. The patient now became slightly constipated and nauseated. She had emesis twice. There were severe pain and marked tenderness in the region of the mass.

By physical examination, it was observed that the patient was well developed and fairly nourished. The expression was anxious and the tongue coated. The temperature was 99.6° F.; pulse, 88; and respiration, 28. The leucocyte count was 13,000. A few dry râles were heard over the entire chest. There was a faint systolic murmur over the apex of the heart. Vaginal examination revealed marked tenderness of the adnexæ; the uterus was enlarged and swollen, and there was a white vaginal secretion. The left tube was swollen, and there was a small hard nodule on the right side of the uterus.

¹ Read before the Chicago Surgical Society, January 16, 1905.

Over the right inguinal region was a soft mass extending from the external abdominal ring into the right labium majus It was slightly larger than an egg, was oblong in shape, being larger below than above, and was irreducible. It was tense, elastic, and very tender

The patient was admitted on a diagnosis of strangulated herma That it was not a herma was recognized after she was anæsthetized An immediate operation was performed An in cision was made parallel to Poupart's ligament. The tumor was found to be separated from the skin by a tough, adherent fascia This fascia was removed. The cystic tumor was opened and an ounce and a half of pale, straw colored fluid removed. The sac was freed from the surrounding tissue, and from the round liga ment with which it was intimately connected, ligated at its highest point, and removed The layers of the abdominal wall were sutured as in a Bassini operation for inguinal hernia the round ligament fastened in the inguinal canal by means of buried sutures The skin incision was closed by silkworm gut sutures in the usual way

On the day following the operation the patient was in fair condition. The temperature reached 100 2° F. The leucocyte count was 28.000 During the next few days the temperature dropped to normal and the leucocyte count fell to 12 000

The anatomical diagnosis was "hydrocele of the canal of

Nuck"

The cyst was bilocular, being divided by the internal abdominal ring into an upper and lower sac. The upper sac lay entirely within the peritoneal cavity. The round ligament entered thus sac and became attached to its inner smooth surface. At the point of entrance was a small opening which allowed a free com munication between the cyst and the peritoneal cavity. The lower sac was much larger than the upper and contained many incomplete septa, giving the appearance of a lymphangioma cys ticum The lower and upper sacs communicated through a narrow constriction at the internal abdominal ring. Near this constriction was found a bean shaped body which lay free in the lower sac

Microscopically the cyst wall was found to be composed of dense fibrous tissue An endothelial lining could not be demon strated in any of the sections examined The sac contained a

homogeneous substance which stained faintly with eosin. There were no cellular elements in the contents, and there was no evidence of inflammation in the cyst proper.

The bean-shaped body which was removed from the lower sac was composed for the most part of fibrous tissue with spindle-shaped nuclei. There was a preponderance of extra-cellular substance arranged in wavy bundles. In a few areas were found groups of young mesoblastic cells. One portion of the tissue was infiltrated with red blood-cells and leucocytes, and in this area were also found numerous engorged blood-vessels with newly formed walls. This tissue bore all the evidences of a recent acute inflammatory process. The presence of blood-vessels in this loose body indicates that it was at one time attached to the wall of the hydrocele.

The relation between the history and the anatomical findings seems fairly clear. The ease of reduction previous to the last week was due to the fact that the fluid could be forced from the lower into the upper sac and into the peritoneal cavity. The reappearance of the tumor after a few days was due to the gradual return of the fluid into the lower sac. The sudden irreducibility was probably due to obstruction of the point of communication between the upper and lower sacs by the bean-shaped body found in the lower sac. It is difficult to explain the origin of this small body, but it would appear from its histological appearance to be of recent inflammatory origin. This view is supported by the clinical findings of acute pain and tenderness in the region of the hydrocele.

The terms Hydrocele in the female, Hydrocele of the canal of Nuck, Hydrocele Muliebris have been applied in a general way to all cysts in the inguinal region in the female.

The classification of these cysts as given by Rignoli seems to most completely describe the various anatomical conditions that may there exist. He divides all cases of Hydrocele Muliebris into five groups:

- (1) Diffuse hydrocele or hydrocele of the cellular tissue about the round ligament.
- (2) An accumulation of fluid in the canal of Nuck, communicating with the free peritoneal cavity.

- (3) An accumulation of fluid in the vaginal process with out a communication with the general peritoneal cavity, an encysted hydrocele
- (4) An encysted hydrocele in the connective tissue about the round ligament A condition similar to group I
- (5) An accumulation of fluid into the remains of an old hernial sac

The existence of a true hydrocele of the canal of Nuck has been frequently disputed French writers in general deny the existence of a true vaginal process of the peritoneum, and therefore do not admit of the possibility of a hydrocele in the female. The researches of Zuckerkandl, Niemann, Bergmann, and Sachs establish the existence of a vaginal process of peritoneum in the female.

Bergmann examined 158 female cadavers between the age of one month and three years, and found the canal patulous throughout in five and partially open in twelve Sachs found it in thirty-seven out of 150, and Niemann in twenty eight of forty six that were examined

Those who claim that it does not exist, base their opinions mostly upon the researches of Velpeau and Duplay The latter examined twenty-one female embryos after the fifth month, and was unable to demonstrate a patulous canal in any

Hydrocele in the female is of clinical importance because of its resemblance to an inguinal hernia. In most of the reported cases the true nature of the condition was recognized only when an operation was undertaken for the cure of the supposed hernia. In a few, as in our case, the symptoms of incarceration or of strangulation added to the objective signs of hernia and made the difficulty in diagnosis still greater. Thierhaber reported a case very like ours.

A woman aged forty two years slowly developed a tumor in the inguinal region, which suddenly increased in size and became painful to touch. The tumor, the size of a goose egg filled the inguinal canal and projected below the external ring into the labium. It was dull on per cussion, tense, and elastic or palpation. With the pain came obstipa tion, yomiting, and abdominal distress. The symptoms led to the diag noss of an inflamed, partially obstructed berma with excressive fluid in

the hernial sac. Operation revealed a bilocular hydrocele, one part within the abdominal cavity. The two chambers communicated, but did not open into the free peritoneal cavity. The contents of the sac was a turbid flocculent fluid. The sac showed evidences of an acute inflammatory process.

Three similar cases are reported by Chiari. In these infection with inflammation of the sac gave rise to symptoms of intestinal obstruction,-vomiting, abdominal distention, and obstipation. Operation revealed the nature of the condition. In these cases unsuccessful attempts had been made to reduce the supposed hernia. The danger of this procedure is apparent. Although the diagnosis of hernia has generally been made in the cases reported, yet, when the possibility of a hydrocele is kept in mind, the true character of the condition may be determined without operation. The presence of a tense, elastic, fluctuating swelling in the inguinal canal, or extending below the external ring that has developed slowly without any known cause, and that gives no impulse on coughing, will suggest hydrocele. Operation gives the only indubitable evidence of the presence of fluid in the sac. That a hydrocele and a hernia may coexist must also be borne in mind. In our opinion the safest diagnostic procedure is incision. This is also the most rational therapeutic measure to employ.

REFERENCES.

¹ Coley. Annals of Surgery, Vol. xvi.

² Duplay. Thèse de Paris, 1835.

⁸ Rignoli. Archiv. Générale, Tome v, 1834.

Sachs. Archiv für klinische Chirurgie, Band xxxv.

⁵ Wachselman. Archiv für klinische Chirurgie, Band xl.

⁶ Zuckerkandl. Archiv für klinische Chirurgie, Band xx.

TUBERCULOSIS OF THE TESTICLE 1

PRIDIDYMECTOMY, GRAFTING OF THE VAS DEFERENS INTO THE GLOBUS MAJOR.

BY IRVING S HAYNES, MD,

OF NEW YORK.

Professor of Practical Anatomy in the Cornell University Medical College Visiting Surgeon to the Harlem Hospital

In inviting your attention to tuberculosis of the testicle, I do so for two reasons, first, because a paper upon this subject has not been presented before this Society for the past five years or more,—and, as it is one of growing importance, I trust this imperfect presentation may not come amiss,—and, second, the emphasis given to the subject in my own mind by a case recently under my care, of which the following is the history

Mr G A E, aged twenty seven years Referred to me by the late Dr Rundlett, January, 1904

Family History—Father died at forty seven, from kidney trouble, had only one kidney Mother living, sixty three, tall, thun, nervous, anænic Sister, aged thirty-six years, same constitution as mother, has tuberculosis of one lung Brother, aged thirty eight years, same general type In fair health

Previous History—Had a first attack of gonorrhoza in 1897 it was very severe. Acute inflammation lasted for two months, this was followed by left epididymits of four weeks' duration Recovery was gradual, but not complete for one year. In 1899 he was operated upon in the Philadelphia Polyclinic for a left varicocele caused by wearing a truss twelve years for hernia Good recovery.

In 1900 a second attack of gonorrhera occurred This also was very severe, and was followed by a right epididymitis which lasted six weeks Recovery was very slow and never complete

In 1901 had a probable recurrence of gonorrhea which was not severe Cured apparently in six weeks Epididymitis did not follow

¹ Read before the New York Surgical Society, January 25 1905

In 1902 there was another slight attack of gonorrhæa. He was circumcised and operated upon for hernia with good recovery and satisfactory results.

In 1903 had a slight discharge from urethra, but this soon stopped. There remained, however, a slight gumming of the meatus and strings in the urine. He was treated by four different persons for seven months, and the condition was the same at the end of that time as at the beginning.

Present History.—January 31, 1904. Tall, thin, anæmic, narrow-chested man. No tubercular evidences anywhere except in the left testicle, in which the epididymis was hard and nodular. Neither the vas nor testicle itself were indurated. The nodule was tender to pressure but not very painful. The right testicle and epididymis were apparently normal. Rectal examination showed the prostate somewhat enlarged, smooth, and not sensitive. No enlargement of the seminal vesicles. Urination was a little more frequent than normal, and often there was burning in the urethra or at the neck of the bladder. The urine showed some mucus and strings floating through it, and by the microscope a moderate amount of pus, streptococci, but no gonococci or tubercle bacilli.

Diagnosis.—Tuberculosis of left testicle, probably confined to the epididymis.

Treatment.—Castration. Recovery satisfactory.

Microscopical examination of the specimen showed the nodules to be tubercular. The slight urethral discharge disappeared, and did not return until his marriage on May 10, 1904.

A painful, hard nodule appeared in the tail of the epididymis of the remaining testicle in April, 1904. This became worse after marriage. The urethral discharge became more free, so that half a drachm would run from the urethra on standing, after sitting, or lying. It was thin and whitish in color. The microscopical examination showed only streptococci. The disease in the right testicle spread slowly, the swelling and induration extending into the body of the epididymis and for two inches along the vas.

The patient was put upon supportive treatment, ichthyol ointment applied to the scrotum, and in June he was sent to the Maine woods. Soon after his arrival there the urethral discharge ceased, and the swelling and tenderness began to diminish in the testicle.

On September 12, 1904, Mr E returned to this city with his general health much improved. The local condition also showed decided improvement. The testicle itself and cord seemed normal, but there was a small, hard and tender nodule about three quarters of an inch in diameter in the globus minor. The nodule did not seem to be connected at all with the testicle proper.

On September 15 assisted by Dr Pisck, after the usual anti septic and preoperative preparations, this operation was performed

The scrotum was anæsthetized by injecting a 1 per cent solu tion of cocaine transversely near its perineoscrotal and inguino scrotal junctions The testicle and cord were exposed through a two inch incision The cord was fully infiltrated with this weak cocaine solution The vas was isolated and severed opposite the globus major The patient did not know when it was divided The upper end of the vas was caught in the surrounding tissues with fine forceps, the lower end clamped The globus minor and body of the epididymis were dissected free from the testicle to the globus major, severed between a clamp and ligature, and removed. No nodule could be felt in the testicle. An incision into the tunica albuginea showed apparently normal testicular structure This incision was closed by fine catgut. Then the globus major was incised, and the end of the vas tucked into the small cut and fastened there by one stitch of No o ten day chromic catgut No attempt was made to close up the opening in the tunica vaginalis, as a large part of it had been removed. The wound was dressed with a wick of catgut and closed by the same suture material

A small artery evidently came to life after a few hours, and a considerable hæmatoma developed in the scrotum This was early cleaned out, and the wound healed throughout, so that within two weeks the patient was out of doors

Dr Ewing's report on this specimen is as follows "There are no definite signs of tuberculosis in any of the three portions of tissue examined Stains for tubercle bacilli in the sections were also negative. In the main mass of the epididymis, however, some of the vessels show considerable numbers of round cells in their sheaths, and this may indicate an early stage of a tubercular process, but it is too slight to permit a diagnosis of tuberculosis"

As we know, however, that the other testicle was distinctly

tuberculous, and this one had every clinical symptom of the disease, there is no doubt in my mind that the process was a tubercular one, and that we were fortunate enough to remove it entire before the later tubercular changes had occurred. The report is especially valuable in confirming what is generally accepted at the present time, viz., that the beginning of the disease is in the blood-vessels, as infection is usually through them.

A month after the operation the patient reported that he was feeling fine. "Seem to have normal sexual power, and there is no pain in scrotum." Returned to the Maine woods for the winter.

November 2, 1904, I received the following report: "General health is excellent. Sexually I am all there, just the same as ever, not a particle of difference in any perceptible way." He wrote on December 11 that his "general health was good. He was strong, active, and had good sexual power. The testicle has greatly decreased in size and is now about as large as a walnut. There are no definite sore places anywhere, but occasionally an ache in the cord. There are no bladder or urethral symptoms." A specimen of semen was forwarded, in which, after being centrifuged, no spermatozoa were found. Consequently the anastomosis attempted failed in this patient.

That such an anastomosis with a patent canal is possible is proved by the result obtained in a case operated upon by Edward Martin (New York Medical Journal, October 10, 1903). His case was one of sterility due to double obliterative epididymitis. He grafted the vas into the tail of the epididymis. In spite of infection and suppuration, the operation succeeded, and, later, normal seminal fluid was obtained. Afterwards his wife became pregnant, and the girl baby born presented a striking resemblance to the father.

Pathology.—Tubercular disease of the testicle in the adult begins, as a rule, in the epididymis. Originating in the globus minor, it invades, by continuity of tissue, the body and globus major of the epididymis, then the vas and the testicle itself. In thirteen cases operated upon by J. B. Murphy (Journal of the American Medical Association, November 10, 17, 24, December 1 and 8, 1900) for genital tuberculosis, the disease

was limited to the epididymis, and the testicle not involved in any In one case the cord and seminal vesicle were also involved Orville Horwitz (Journal of the American Medical Association, June 21, 1902) found in unity six cases operated by himself that the disease was primary in the epididymis forty eight times, in the testicle twenty seven times, and in the remaining twenty one cases in other regions than the epididymis or testicle. Von Bungner (Beitrage für klinischen Chiringie, Band xxxv, Heft 1) finds the epididymis iisually involved first, then the vas next, the testicle, the prostate, and seminal vesicles only very infrequently.

Etiology -The path of infection is usually by way of the blood vessels, and the arteries to the epididymis present. according to Saltzmann (quoted by Horwitz), an anatomical arrangement predisposing to the development of tuberculosis here, for the spermatic artery divides opposite the epididymis and the vessels to that organ are smaller and more tortuous than those to the vas or testicle, and the blood stream in the vessels of the epididymis is therefore slower. The condition plus some slight traumatism predisposes to the arrest of the tubercle bacilli at this point. Involvement by way of the lymphatics is very rare, but possible Descending infection through the vas is not considered now to be as frequent a path of invasion as through the blood vessels, but that it is possible, aside from the opinion of many writers, the experimental production of tuberculosis of the epididymis by Delli Santi (Riforma Medica, Vol xix, No 28, 1903) establishes this con tention He was able to produce tubercular epididymitis in the dog by injecting tubercle bacilli into the urethra. It was necessary, however, to produce a pathological condition by ligating the spermatic veins and produce venous stasis in the organ The control animals not injured did not develop tuber culosis

The predisposing factors may be briefly summarized as follows

Age About thirty, when the glands are most active Heredity Possibly shown in those cases developing in infancy Traumatism. This, whether slight or severe, probably plays a very pronounced part in locating the disease in the epididymis, as already explained, by the normal arrangement of the blood-supply.

Previous gonorrhea. Murphy attributes to gonorrheal epididymitis or posterior urethritis the most important predisposing factor in the subsequent development of tuberculosis of the epididymis and testicle. Paul Thorndike (Boston Medical and Surgical Journal, July 3, 1902), in reporting seventy-five cases, found gonorrhea to be an immediate cause in twenty-five. E. Haas (Beiträge für klinischen Chirurgie, Band xxx, Heft 2) assigns to gonorrhea a causative action in only 5 per cent. of his cases.

The disease is usually unilateral, the right more frequently involved than the left. In only a very small proportion of cases (3½ per cent., Haas) is the disease bilateral, although, whichever testicle is involved first, the other is soon affected in 38 per cent. of cases (Haas).

The pathological changes in brief are but the repetition of tubercular processes elsewhere. The structures first involved are the intertubular connective tissues of the epididynis. The other structures are gradually implicated by the extension of the process by a continuity of tissue. Discrete tubercular nodules later become fused together. They remain such or undergo caseous degeneration, form an abscess which may remain encysted, burrow, or discharge externally by one or several sinuses. The vas, tunica vaginalis, mediastinum testis, the seminal vesicles, and prostate may become involved.

The progress of the disease is slow or rapid, depending upon the general health of the individual and the absence or presence of mixed infection.

Signs and Symptoms.—The signs and symptoms appear insidiously and progress slowly, unless there be very poor health and a mixed infection, when the onset may be sudden and the course rapid and violent.

The first symptom is usually a feeling of weight and discomfort in the testicle, some tenderness of the part affected, seldom developing into pain until the disease has lasted quite a considerable time. The pain then felt is dull, aching, may extend in the cord to the groin or even, be felt in the back. These sensations are usually intermittent, disappear on rest to return on exercise. The first sign of the disease is the appearance of a hard nodule at the lower part of the epididymis, insually of slow but progressive growth. This nodular induration later involves the entire epididymis, then the vas for a varying distance, and, lastly, the testicle itself. A small ydrocele may be present. A urethral discharge usually exists, varying in quantity and character, usually small in amount, thin and milky, but may be profuse, purulent, or bloody. This discharge promptly disappears after removal of the tuberculous nodule.

The vesical symptoms are usually late in appearing and are not urgent. There may be merely irritability of the blad der, marked by discomfort and burning attending the frequent incturation, or there may be severe pain, tenesmus, and even strangury. The more severe symptoms, however, do not appear when the disease is limited to the testicle. The urine rarely gives positive evidence of the disease. When tubercle bacilli are found in the urine the disease has passed far beyond the epididymis. Caution should be used in looking for the tubercle bacilli not to mistake the smegma bucillus for the one sought. Piis, blood, and mucus will usually be present in the urine, but these are not pathognomonic of the disease in question.

If the local lesson is not removed early the disease involves the entire epididymis, the nodules soften, break down, fluc tuate, and the purulent contents may burrow into the tissues of the secretum, or more often open spantaneously by one or more situses, which may discharge for months

The general symptoms are those attending a tubercular process anywhere, and vary with the activity of the genital lesion, and whether there are other centres of infection, as consumption, hip disease, etc., or not

The sexual function is usually preserved

Differential Diagnosis.—Tuberculosis of the testicle has to be differentiated from simple infections, gonorrheal or syphilitic inflammations, and benign or malignant growths of the organ. The time does not admit of a further consideration of these affections.

Horwitz advocates the use of tuberculin as a test for tuberculosis, and in doubtful cases it should be employed.

Treatment.—The formulation of the best course to be followed in a given disease is based partially on theory, but much more on practice. Theory is valuable, practice is essential to any correct conclusions. Therefore let us first review the results obtained by different operators with various methods.

E. Albert (*Therapie der Gegenwart*, January, 1900) denounces castration for tuberculosis of the epididymis. He restricts operative treatment to incision and evacuation of the nodules, and claims that castration is not required in tuberculous epididymitis, or else the disease has extended to the seminal vesicles and castration is useless.

L. Louguet (Revue de Chirurgie, January, 1900) advises early interference. He limits himself, however, to evacuating the abscess, curetting and cauterizing the cavity or searing it with very hot water. He claims that the "results surpass expectation in cases thus treated." He further states that castration is useless to check the spread of the disease.

In Annales des Mal. Org. Gen.-Urin., Paris, June, 1902, Bodanowicz advocates the injection of camphorated naphthol in amounts varying from a few drops to one cubic centimetre. This proved efficacious in two cases out of six. The method is limited to those cases where pus is present. This is first aspirated and then the injection made. The method is too uncertain to be used when there are so many better ones.

Von Bruns (Centralblatt für Chirurgie, July 20, 1901) gives a summary of the results in 111 cases of castration for the past fifty years, performed at Tübingen; 46 per cent. of unilateral castration were cured from three to thirty-four years; 56 per cent. of bilateral castration were cured from

three to thirty years One half of all castrated patients were permanently cured In all these cures the tubercular process was restricted to the genital organs. When the process involved the urinary system all have died

P Maŭclaire (Press Medical, September 22, 1900) treats gental tuberculosis by double ligature of the spermatic cord and excision of the included portion. The testicle soon estabsises collateral circulation with the neighboring parts. The advantages claimed are the isolation of the tubercular focus and retention of the testicle for its physiological function in maintaining sexual power. He claims this method may prevent infection of the remaining testicle, which is not usually secured by castration.

Von Bungner (Bettrage zur klunschen Chriurgie, Band xxxv, Heft 1) claims continued success with his method of treating tuberculous testicles by avulsion of the vas high up through a high external incision for castration. He states that four-fifths of the vas can be thus removed. Horwitz con demns this procedure in vigorous terms as unsurgical and dangerous, and claims several serious homorrhages have followed the operation.

Von Bungner also advocates injection into the vas of a 10 per cent solution of iodoform in glycerine, three to four grammes being injected upward and half this quantity down ward. He has treated eighteen cases by his so called method of "high castration" for tuberculosis restricted to the testicle and vas alone, supplementing this by the todoform injection when he thought the entire tract was involved. As a last resort, he resected the entire tract, but this is very seldom necessary. He claims a total of 866 per cent cures by his method, as contrasted with 46 per cent of cures in unlateral and 56 per cent in bilateral castration reported by Von Bruns, 66 per cent of cures obtained by Simon in ninety-two cases, and 26 per cent of cures in forty-five cases that Kocher treated

The various methods—castration, avulsion, ligature and resection, incision and drainage—have their advocates

The

method of avulsion in connection with castration is too unsurgical and dangerous to be advocated. Incision and curetting are not a radical treatment for this disease in the early stage when cure is possible, although it may be useful as a palliative method later. Injection is of doubtful utility and a waste of time because it cannot by any possibility reach to and destroy all the diseased area, and postpones any other operation when delay is dangerous. Resection of the spermatic cord after double ligature, according to the statements of the originator, Maŭclaire, promises much, but its ultimate value is yet to be determined. A serious objection is that the diseased focus is not excised and remains as a menace to the individual. Castration is not followed by the brilliant results one would expect from so radial an operation. And it is especially objectionable where both testicles are involved, as impotency will follow. The psychological state dreaded by some writers after double castration seems not to have much basis in fact, and therefore does not play much of a part in our judgment as to the value or not of castration per se. But the loss of sexual function after double castration is sufficient in itself to cause most patients to put off the operation to such a distant time that no operation will be curative.

What have we then to offer our patients? Namely, this: A partial or complete epididymectomy with high resection of the vas, as first performed by Murphy in 1894; or epididymectomy with a grafting of the vas into the remaining portion of the epididymis, as attempted by Lilienthal in 1900 (personal communication), without, however, forming a patent canal, but with cure of the disease; or excision of the epididymis with a grafting of the vas into the rete testis or commencement of the coni vasculosi, as performed by Rasumowski in 1902 (Archiv für klinische Chirurgie, Band lxv, Hefte 3 and 4), who operated on four patients with retention of the sexual function.

Judging from the results obtained by Murphy (thirteen cases), Willy Meyer (Annals of Surgery, Vol. xxx, p. 649) (one case), Howard Lilienthal (personal communication)

(one case), and myself in the one here reported, the results from epididymectomy are more favorable than the best results obtained from castration, for in twenty epididymectomies there were only two deaths, one from probably tubercular kidney and the other from spinal disease This gives go per cent of cures There was no extension of the disease in any of the cases to the portion of the testicle left behind, to the seminal vesicles, or to the prostate, and in only one to the kidney, and one to the spine, both of which died In two cases of excision of the endidymis, in which the other testicle had been previously removed by castration, and in all cases where both epididymi had been removed at the same or different times (seven cases), the sexual function was preserved While to the surgeon this fact may have small weight in influencing his choice of castration or epididymectomy, to the patient it is the one great argument that decides him in favor of an early operation, a curative procedure, and the retention of his man hood, as against a late and imperative castration of doubtful final utility, with loss of the sexual function

The much dreaded psychological state following double castration occurs so very infrequently that we can disregard thus possibility entirely. If it has any weight, it certainly is on the side favoring the conservative procedure.

Whether we shall attempt an anastomosis or not between the vas and the remaining part of the epididymis or testicle is a question to be settled for each individual case. In spite of the failures in tubercular cases such anastomosis has been successfully performed in one instance of double obliterating epididymitis from gonorifical origin (Martin, New Yorl Medical Journal, October 10, 1903), and there is no especial reason why it should not succeed in tubercular disease limited to the epididymis with improved technique

It will take several years and numerous operations to finally decide the question At all events, we are fully justified in performing epididymectomy to castration in the usual form of tubercular testicle, and in attempting an anastomosis of the remaining portions of the vas and testicle, providing these parts are free from tubercular disease

RUPTURE OF THE TENDON OF THE BICEPS FLEXOR CUBITI.¹

A CASE OF RUPTURE OF THE LONG TENDON IN ITS CONTINUITY, AND ONE OF RUPTURE OF THE SAME TENDON AT THE GLENOID ATTACHMENT;

OPERATION WITH SUCCESSFUL RESULT IN EACH CASE.

BY WILLIAM W. KEEN, M.D.,

OF PHILADELPHIA,

Professor of Surgery in the Jefferson Medical College.

Case I.—Dr. John B., aged fifty-four years, who regularly practises athletic exercises, first consulted me, December 16, 1904. His father and mother suffered from rheumatism and neuralgia. He himself had had muscular pains from time to time, but never a distinct attack either of articular or muscular rheumatism. He has had several attacks of diarrhea. Five years ago had a severe attack of pleuropneumonia. When twenty years old was only five feet tall and weighed ninety pounds; at twenty-four his height was five feet two inches and he weighed 106 pounds. After his attack of pneumonia he weighed but eighty-five pounds. At present his height is five feet six inches and his weight 125 pounds. When a young man, his health was so poor that he was advised to go to Colorado. His persistent athletic practices are readily explained as a means he has adopted, and very successfully, to obtain robust health. Even in the very cold weather of this winter. I found that he only wore an open meshed undershirt.

In June, 1902, a pupil by accident let an Indian club slip, striking Dr. B.'s right shoulder on the anterior surface while the muscles were tense. No ecchymosis followed, but for six months abduction of the elbow was impossible, not from pain, but from muscular inability to lift the elbow. Twice since then he missed catching a hand-ball and fell forward, striking on his right shoulder.

On December 8, 1904, in a violent muscular effort to catch a hand-ball, he suddenly felt a pain about the junction of the upper and middle thirds of the right arm, so severe that he stooped

¹ Read before the Philadelphia Academy of Surgery, February 6, 1905-756

and twisted his body to enable him to bear the pain. He noticed a lump on the arm, but paid little or no attention to it, as the pain quickly subsided. On December 13, he made a hand spring and again felt the pain at the same place.

On examination, December 16, I found that when he made forcible flexion of the forearm to a right angle and I resisted the flexion, the bicepts' belly terminated at its upper portion suddenly, and I could not feel the tendon above that point The upper end of the belly of the biceps also felt very flabby and soft, almost as if it were a hæmatoma, though not quite so soft

My diagnosis was a rupture, more likely of the long head of the biceps. He had had but little pain and his disability



FIG 1 -The tortuousness of the tendon of the long head of the breeps



Fig 2—Shows the fusiform swelling of the tendon below the bicipital groove and the mode of shorten ag the elongated tendon and substruct the two ends while held that

as a result of the accident both he and I estimated at about 25 per cent. The difference in outline of the two arms was more marked to the touch than to the eye, and hence I do not reproduce the photographs taken at the time.

In view of his athletic disposition, I advised and he accepted immediate operation

Operation, December 18 1904 I laid bare the biceps muscle and its upper tendons. The short head I found intact. The tendon of the long head lay tortuous like a snake (Fig. 1), extending from the body of the muscle upward. I had expected to find the tendon torn away from the belly of the muscle, but I found the two continuous. Tractom on the tendon showed that

its attachment to the rim of the glenoid cavity was also firm. I dissected under the deltoid for a short distance upward till I reached the groove in the head of the humerus. About two centimetres below the groove began a fusiform swelling in the tendon extending downward about 1.5 centimetres (Fig. 2). This portion of the tendon was markedly discolored, almost black, evidently from blood effused within the sheath, but the sheath was intact. It was clear, therefore, that the tendon itself had been torn or ruptured within its sheath, and was much elongated, this partially destroying the function of the muscle. I severed the tendon just below the discolored portion, and, while each end was held taut overlapping the other about two centimetres, I sutured the two ends together with twenty-day chromicized catgut (Fig. 2). The arm was then placed on a rectangular splint so as to relax the biceps muscle. He went home, December 26, with the wound entirely healed.

January 26, 1905. He called to see me to-day. The splint was worn for two weeks after the operation, and the forcarm was carried in a sling for two weeks more. At the end of that time he tells me he began doing athletic "stunts" with the arms, and has felt only the inconvenience which comes from weakness of the right biceps, due partially to non-use for a month. The muscular belly is quite flaccid as yet, and it is smaller than that on the right side by half a centimetre. The exercises he has taken have not been violent or prolonged, and presumably the biceps will improve very much in time.

[March 31. He is now practically as well as ever. The deformity of the biceps has almost disappeared.]

Case II.—Dr. J. Chalmers Da Costa has kindly given me the following notes of his case: "In May, 1904, a man, aged fifty-two years, while lifting a heavy bucket or pail, was suddenly seized with violent pain in the upper arm. He dropped the bucket, and for several days kept his arm bandaged and in a sling. I first saw him several days after the accident. Flexion of the forearm could be slowly executed, but was feeble, painful, and incomplete. On attempting flexion, the short head of the biceps contracted and the belly of the muscle became abnormally prominent, but the muscular 'bunch' thus produced was flabby and nearer the elbow-joint than normal. An incision disclosed the long head of the biceps curved like a snake. When pulled upon,

it came entirely out of the bicipital groove. A portion of the periosteum had been torn off with the tendon, evidently from the margin of the glenoid cavity A portion of the upper end of the tendon was cut off and the tendon was attached to the short head by splitting the latter and suture Primary union followed At present, nine months after the accident, the arm and forearm are strong and active

He uses the arm for all

The biceps actively flexes the forearm, the short head is much enlarged"

REMARKS -- Prior to the present cases there have been published only one case of operation for rupture of the belly of the biceps and one for rupture of the tendon

Loos (Beitrage zur klimschen Chirurgie, 1900, Vol XXIX, p 448) is in error when he states that Legueu operated (See Revue de Chirurgie, 1895, Band xi, p 897) No operation was done by Legueu, and the cicatricial node in the tendon was not in the biceps, but the triceps tendon. The article of Loos just referred to and the earlier one by Maydl (Deutsche Zeitschrift fur Chirurgie, 1882, Vol vin, pp 306 and 513, and Vol viii, p 35) covered most of the published cases up to 1000 These amounted to sixty six in all

I have not made further search of the literature than through my own card catalogue This shows that there should be added to Loos's list the four cases reported by G G Davis (Medical News, 1895, Vol Ixvii, p 121), Da Costa's, and my own cases herewith reported These make a total of seventytwo cases Loos states (p 430, foot note) that Petit has col lected eighty-three cases of rupture, but that the paper had not been published in 1900 nor have I found it since

It is a matter of surprise that a tendon should rupture in its continuity rather than that the muscular belly should yield or the tendon be torn loose from the muscular belly at the point of transition from the one to the other, or from the bony attachment of the tendon There is, however, no doubt, as in my case, that this does occur

I think Davis is, however probably right when he says "the tensile strength of healthy tendon is so great that it is my belief that true rupture is much rarer than is usually supposed, and that when a tendon does rupture, it is very likely to have been diseased." Yet, on the other hand, in a number of cases no prior disease was known. In the present case, in view of his prior history and later athletic life, there may or may not have been disease of the tendon.

Rupture of the biceps may take place at several points:

- (1) In the belly of the muscle,
 - (a) Either that portion belonging to the long head;
 - (b) That belonging to the short head, or,
 - (c) The belly after union of these two portions.
- (2) At the transition point between the muscular belly and one of the upper tendons.
- (3) The transition point between the belly and the lower tendon.
 - (4) In the continuity of the tendon of the long head.
- (5) At the point of insertion of this tendon to the rim of the glenoid cavity, or at least within the capsular ligament.

In some cases it is not easy to make an exact differentiation of the site of the rupture, hence all tables are to some extent unreliable. It is to be noted that *only in the operative* cases has the exact condition been verified by sight.

The combined cases of Loos, Davis, and this paper give for rupture of the muscle itself fifty cases as against twenty-two in the tendons, but of fifty-six cases in Loos's paper with more detailed histories to which Davis's four cases and these two are added, making sixty-two in all, there were forty-one of the muscle and twenty-one of the tendon. But from these twenty-one of rupture of the tendon six should be deducted as being at the point of junction of the tendon and the belly and the case of Legueu, which should not have been included. This leaves only fourteen cases of rupture of the tendon. The belly of the short head was only involved in two cases, and both of these were due to direct injury,—one in a threshing-machine, in which the tendon of the long head was also involved, and the other in an attempt at reducing a luxation of the shoulder.

In the larger series of Petit, the proportion is given as follows

Rupture of the whole muscle, 21, of the long head, 9, at the transition point between belly and tendon, 7, of the lower tendon, 3, of the tendon of the long head, 43

I think that there must have been some error in tran scribing, for it would be extraordinary to have forty three cases of rupture of the tendon of the long head and only nine of the muscular part of the long head. As stated, Petit's paper has not yet been published

Besides the case here reported, there are only six cases of stretching or partial rupture of the long head similar to the present cases. Of all the cases reported by Loos, only four of rupture of the muscle and one of the tendon were caused, as in the oresent care, by muscular effort alone.

Of all the reported cases only two occurred in women

The symptoms of rupture differ in rupture of the belly of the muscle and of the tendon The muscular belly, either the whole of it, or (if the rupture involve, for instance, only the belly of the long head) a part or the whole muscle, becomes softened and loses its elasticity. Sometimes, in rupture of the belly into an upper and lower portion, there will be two tumors formed by the contraction of the two portions of the belly of the muscle, with a marked furrow between them from one to two fingers' breadths wide At the bottom of this furrow, sometimes even the bone can be felt. If the rupture is at the junction of the tendon with the belly, this double tumor, of course, will not exist, but there will only be a tumor of the belly and none of the tendon If the rupture be of the belly of the long head, the muscular belly of the biceps will be drawn belly of the muscle, the whole muscle will be drawn up nearer the shoulder

In an excellent paper by White (American Journal of the Medical Sciences, January, 1884, p 17), on dislocations of the long tendon of the biceps, the differential diagnosis between that lesson and rupture of the long head of the muscle is well stated; and one other point of importance is mentioned, namely, that in rupture, the head of the humerus, not being held down by the long tendon, is approximated more closely to the acromion, and the shape of the shoulder correspondingly altered.

When the long tendon is ruptured completely or partially, the symptoms are less pronounced, partly because only a portion of the muscle is involved and partly because the sheath of the tendon to some extent replaces the tendon. Of course, there is much less ecchymosis and the discoloration is not pronounced. Only the portion of the muscle corresponding to the long head is flabby and has lost its tone, so that it feels like a cyst or a hæmatoma.

Unfortunately, in my case, I did not observe whether Hüter's symptom was present. He called attention to the fact that flexion of the forearm in supination when the biceps is relaxed is much less forcible than when the hand is in pronation, and the biceps is more tense and can contract to greater advantage.

Treatment.—The treatment in almost all cases has been either none at all, where patients have neglected to seek the surgeon till long after the accident, or by means of a bandage with or without a splint, massage, and electricity. I mention the latter only to condemn it save in the later stages, after the rupture is healed. Then it will do much good in restoring the functional activity of the muscle. Earlier than this it would but separate the two portions instead of approximating them.

In a few cases good functional results have been obtained, for it is possible sometimes, by manipulation and bandaging, to approximate the two parts of the muscle if the rupture be in the muscle, so that union will take place by fibrous tissue with but little loss of function. If the rupture be confined to one portion of the muscle, of course the chances of restoration of function are much better than when the whole of the muscle is involved. Yet, often in the cases of only partial rupture, loss of function is very marked. This is not only

It is strange that surgeons have so rarely operated. The cases in which operations have been done thus far are as follows

- I Von Hochstetter (Wien med Woch, 1890, p 399) A very muscular man of forty six years. Over two months after the injury, the upper end of the belly of the muscle and the tendon which had been torn loose from the belly were united with silk. After four months complete ability to work returned.
- 2 Bazy (Bull Soc de Chrurge 1895, p 156) A man, aged forty years, in whom there was a complete rupture of the tendon of the long head within the joint or even detach ment of the tendon from the glenoid cavity as a result of lifting a sick weighing eightly kilogrammes. The tendon was reflected upon itself so that the torn upper end was turned downward. Bazy resected the tendon and united the stump to the tendon of the short liead and the cornoo-brackivil. The arm was placed in plaster at a right angle. After one month there was complete restoration of function.
- 3 In my own case, the patient at the end of a month resumed, to a moderate degree, his athletic occupation and is now quite himself again
- 4 The case of Dr J Chalmers Da Costa The lesion and the operation were identical with Bazy's case The result was very satisfactory, entire use of the arm having been regained

The most encouraging results from these four cases of operative interference and the poor result in many others not so treated, it seems to me, should lead to operative treatment of cases of rupture rather than to trust to the more or less uncertain results of the treatment by bandages and splints

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, January 11, 1905.

The President, Howard LILIENTHAL, M.D., in the Chair.

CALCULUS IN URETER: PERINEPHRIC ABSCESS.

Dr. Howard Lilienthal presented a boy of twelve years, who was admitted to the medical service of Mt. Sinai Hospital on October 3, 1904. The diagnoses which were considered in his case were, first, typhoid fever, complicated by appendicitis; second, appendicitis alone; third, meningitis, complicated by appendicitis. His illness was of sudden onset, with high fever and rapid pulse. There was a leucocytosis of 20,000; no enlargement of the spleen; no eruption; no Ehrlich; no Widal. The fever was continuous, with only very slight remissions. There was an absence of the definite local signs of appendicitis.

A week after the boy's admission, the abdominal tenderness became localized in the right side, and there was acute sensitiveness in the right axillary line, below the third rib. When Dr. Lilienthal first saw him at this time, he noted the tenderness in the region of the appendix, but, on account of the large area over which it extended, the doubt as to diagnosis, and the absence of urgent symptoms, he advised against immediate operation, and suggested that the patient be poulticed and watched. This was done. The temperature continued to run up to 105.5° F. and the boy became much emaciated. Finally, he began to complain of pain in the right loin. Before that time, the possibility of a calculus in the ureter had been suggested, and this belief was subsequently strengthened by the presence of a few pus and red blood-cells in the urine.

The pain in the lumbar region persisted, and gradually very slight, deep doughy fluctuation could be made out in that area On October 11. at Dr Libenthal's request, Dr Elsberg made an incision over the right loin and found pus in the subphrenic region A few days later there was a urinous discharge from the wound Following this operation, the boy's temperature dronned, and he remained in good condition for a number of days Then the temperature went up as high as before, and a nephrot omy was decided on, which was done by Dr. Lilienthal on Novem ber 16 A soft bougie was first inserted into the sinus, and then the kidney was cut down upon The organ was very large and hard It showed no evidences of suppuration, but there was evidently a collection of pus involving the perinephric tissues Upon following down the ureter, he came upon the soft bougie, which had entered an old perforation of the ureter about two and one half inches below the pelvis of the kidney. In spite of repeated efforts, the soft bouge could not be pushed down into the bladder, nor could colored fluids, introduced from above, he forced through the apparently occluded ureter

The kidney was then incised and a finger introduced into its pelvis. No stone nor other abnormality could be discovered, nor could any calculus be detected in the ureter by instruments introduced from above On account of the age of the patient, ureteral catheterization through the bladder was not attempted

Several days after the operation, Dr Libenthal said he again attempted to force blue-colored fluid through the ureter from above, and about half an hour later a small quantity of greenishtinged urine was passed. From this time on the boy's urine became very muddy, containing large quantities of mucus and pus, with some blood and casts Several X ray pictures, in different positions, were taken by Dr A G Foord, assistant radiog raphist to the hospital, with the greatest care but no stone could be detected. The kidney was flushed out daily by means of the injection of large quantities of water. The wound healed nicely, and on December 26 the boy was allowed to go home, with instructions to always urinate through several layers of gauze, so that in case a calculus was passed it would be detected. At this time the patient's condition was still unfavorable, and every four or five days he would have a sudden elevation of temperature Three days ago his attending physician sent word that the calculus had passed spontaneously, but that unfortunately it had been lost. With the expulsion of the stone, all the boy's symptoms disappeared, and the urine became clear.

Dr. Lilienthal said he believed that a radical operation for the removal of the stone in the ureter in this case might have resulted fatally. The patient's condition at the time was very poor, and such an operation would have necessitated a very long incision and a careful dissection. In the majority of cases of ureteral calculus, the speaker thought it was just as well not to operate, unless the X-ray showed the stone to be of such a size that its spontaneous expulsion seemed improbable.

In reply to a question as to the origin of the hole in the ureter, Dr. Lilienthal said it evidently must have resulted from an infection from the scraping of the stone. In reply to a question by Dr. Whitman, the speaker said that the limb on the affected side was not held in a flexed position. The so-called Meltzer sign—increased pain on hyperextension of the leg—was present.

CERVICAL RIB.

Dr. Lilienthal presented a woman who had been referred to him by Dr. Manges. About a year ago she began to complain of pain in the left shoulder and neck. This pain was cramp-like in character, and radiated down the left arm to the finger-tips. She suffered at times from palpitation of the heart, the attacks being especially severe after the pain. She also complained of occasional difficulty in swallowing, of headache, and of a girdle-like sensation about the throat.

On examination, nothing was found but a tumor in the neck, which was easily recognized as a cervical rib. On deep inspiration, the left pulse was completely obliterated. There was a bruit over the left subclavian artery, which ceased on deep respiration, and reappeared, with increased loudness, after holding the breath. The neck was tender on palpation.

On account of the patient's symptoms, an operation for the removal of the supernumerary rib was determined on, and it was done after an X-ray picture of the condition had been taken. Upon deciding in favor of an anterior operation, an incision was made directly over the rib between the fibres of the sternomastoid muscle. The soft parts were then pushed up as far as possible towards the cervical vertebra, with which the rib articulated pos-

teriorly. He then cut through the rib with the bone forceps, and twisted off its upper or posterior section. Anteriorly, it was found to be firmly attached by osseous umon to the first rib, and, as all embarrassment to the circulation had been apparently releved, no attempt was made to chisel off the anterior section of the bone. The rib was removed to the level of the rather high arch of the subclavian artery. Further dissection would have been attended by great danger. A large part of the scalenus muscle had a tendinous attachment to the rib.

Immediately after the operation, the tingling sensations in the left hand were slightly increased, but the pulse remained absolutely normal. Within the past few days, however, it had become intermittent, and was completely obliterated on deep in spiration. This Dr. Lilienthal attributed to the firm cicatrix resulting from the operation, and he thought the symptom would disappear permanently in time with the atrophy of the scar. A supernumerary rib also was present on the right side, but it was much smaller and gave no symptoms.

DR IRVING S HAYNES said he thought this condition of cervical rib was comparatively rare, as he could not recall more than a single instance of it during a long experience in the dissecting room

DR GEORGE E BREWER mentioned a case in which this ab normality gave rise to severe pain over the distribution of the brachial plevus on one side, which was relieved by removal of the rib. In this case the patient was for a time thought to be suffering from a malignant new growth

Dr Brewer said he had recently had the opportunity of looking over Professor Dwight's very beautiful collection of abnormalities of the ribs in the Anatomical Museum at Harvard University. This included many specimens of cervical and lumbar ribs, and asymmetries on both sides of the thorax

DR OTTO G T KILIANI said he did not think this condition was very uncommon. In a case that recently was under his observation, the patient had a carcinoma of the storner, and, because of difficulty in swallowing, it was also thought that he had a cancer of the cesophagus. Upon investigation, it was found that the dysphagia was due to a spasm of the esophagus produced by a right sided cervical rib.

Dr. Lilienthal, in closing, said he had seen several cases

a cortical one, resection of the cervical nerves ought to control the spasm. He suggested that lengthening the muscle by a plastic operation might have a beneficial effect. If the muscle could be lengthened to such a degree as to well over-correct the spasm, the deformity would not be so pronounced.

DR. WHITMAN, in closing, said that he was surprised to learn that the prognosis was thought to be so bad after operation for this condition. Richardson and Walton, of Boston, who had reported by far the largest number of operations, found lasting benefit resulting in a majority of their cases. In reply to Dr. Peck, the speaker said that the ultimate outcome of this condition, if left undisturbed, was not extremely unfavorable, since spontaneous recovery was not unusual after several years; but in the meantime the patients suffered a good deal of pain and discomfort both physical and mental, and were practically incapacitated. He did not think that much could be accomplished by overstretching the muscles or by plastic work. There were too many muscles in this collection to lengthen them all. While neurologists knew nothing positive about the etiology of spasmodic torticollis, they usually looked upon it as a cortical lesion. After the condition had existed for a number of years, the affected muscles became hypertrophied and permanently shortened. The mental and moral effect of such a noticeable and disabling affection must also make the operative diagnosis worse in cases of this class.

SMALL, ROUND-CELLED SARCOMA OF THE BACK SUC-CESSFULLY TREATED BY THE X-RAY COMBINED WITH THE MIXED TOXINS OF ERYSIPELAS AND BACILLUS PRODIGIOSUS.

Dr. William B. Coley presented a boy of eleven years, whose family history was good. In the latter part of August, 1901, he fell from a stoop, striking on his back. Two or three weeks later his mother noticed a swelling in the midscapular region, a little to the left of the median line. This swelling increased very rapidly, and was soft and fluctuating from the beginning. The patient was referred to Dr. Coley on December 23, 1901, by Dr. Polhemus, of Nyack, New York.

Physical examination showed a cystic swelling, the size of an orange, in the left scapular region. The skin was normal. The tumor was fluctuating, and situated, apparently, beneath the skin and superficial fascia A diagnosis of hæmatoma was made, and on January 12, 1902, an meision was made under ether anæsthe sia Several ounces of dark blood were evacuated. There was no evidence of any solid tumor at this time. The wound was closed without drainage, and healed by primary inion. About three weeks later a tumor began to develop at the original site. This was also cystic in character, and increased rapidly in size until May 6, when it had become one third larger than that previously operated upon. It was again incised under ether, and at this time, in addition to fluid blood and clots there was such a thickening of the walls of the cyst that it raised a suspicion of sarcoma. A portion of this thickened tissue was removed and examined by Dr. H. T. Brooks, Professor of Pathology at the Post Graduate Hospital, who pronounced it a small, round celled sarcoma of high vascularity.

Two weeks after the operation, and before the wound had entirely healed, the X-ray treatment was begun, and continued. three times weekly, during the entire summer and fall of 1902 In December of the same year there was still marked evidence of local recurrence in and about the cicatrix. The tumor continued to increase in size in spite of X ray treatment. On January 26, 1903, Dr Coley operated for the third time, and removed the recurrent tumor, together with the old cicatrix The wound healed by primary union Shortly after the patient left the hospital, the X-ray treatments were resumed, and continued once or twice weekly during all of 1903 and the first half of 1904 In June of that year signs of another recurrence were noted in the old cicatrix, and at this time, in addition to the X-ray treatment, he began the injections of the mixed toxins of erysipelas and Bacillus prodigiosus in the vicinity of the scar The injections were con tinued from July 4 up to the present time a period of about six months, in addition to two X ray treatments weekly Under this combined treatment, the recurrence slowly disappeared, and the ulcerated area healed over At the present time there was no trace of a growth visible anywhere The boy's general health had always remained perfect

SARCOMA OF THE FEMUR.

DR Colley presented a man numeteen years old, who first noticed a swelling in the lower portion of the left femur in November, 1901. This gradually increased in size, and was accompanied by loss of weight and deterioration of general health. The patient came under Dr. Coley's observation February 5, 1902. At that time physical examination showed a large tumor extending from the condyles of the left femur to the junction of the middle and upper thirds. The tumor consisted of a fusiform enlargement of the entire lower two-thirds of the femur; on the outer aspect of the thigh, about one and one-half inches above the joint, there was a soft, fluctuating area, just covered by thin and reddened skin. There was also impairment of the functions of the joint, but no swelling of the joint itself. An incision was made under cocaine into the fluctuating area, and three ounces of clear serum, similar to that which is found in cystic degeneration of sarcomatous tissue, was evacuated. The curette passed into the cavity of the bone, and typical sarcomatous tissue was removed. Microscopic examination by Dr. E. K. Dunham showed it to be round-The patient absolutely refused operation, celled sarcoma. although he was told that this was the only thing that offered any hope of saving his life. The X-ray treatment was tried entirely as an experiment, with the result that the tumor decreased one inch in circumference. After a month's treatment the exposures were discontinued for two weeks, at the end of which time the tumor had increased nearly an inch in size. The treatment was again resumed and the growth slowly decreased in size, until at the end of another month the circumference of the thigh over the centre of the tumor was one inch less than the original measurement. The treatment was continued four times a week up to September 30, 1902, when the leg was nearly normal in size and the patient had gained twenty pounds.

In December, 1902, a metastatic tumor developed in the left pectoral region. This grew rapidly, until it had reached the size of a hand, and was then partially removed under ether anæsthesia. It was found to be very soft and highly vascular. Shortly after this, a large tumor, the size of a child's head, developed in the right iliac fossa, extending from the costal cartilages down to the pelvis. It could be easily felt in the lumbar region. At this time, in addition to the local treatment with the X-rays in the femoral and pectoral regions, injections with the mixed toxins of erysipelas and Bacillus prodigiosus were begun. After a few weeks the large tumor in the iliolumbar region began to soften and break

down, and when it had become completely fluctuating, it was opened posteriorly A very large quantity of necrotic tumor tissue was evacuated, and the wound was drained for about a year. While the tumor in the leg had apparently disappeared, there remained a marked thickening of the bone, and the sinuses lead ing to the broken down areas persisted. Examinations of several curettings failed to show any evidence of sarcoma. At the present time, aside from the sinus in the leg, the boy appeared to be in perfect health, and there was no evidence of sarcoma to be found anywhere

In view of the fact that periosteal round celled sarcoma was probably the most malignant of all varieties, running its entire course in from one to two years if left untreated, and usually recurring and proving fatal within a year after hip joint amputation, the result in this case, whether it proved cutative or not, was extremely interesting Dr Coley said that in all of the six cases in which he had performed hip joint amputation, recurrence took place within a year, and death within eighteen months

DR. LILIENTHAL said he was using the mixed toxins of erysipelas and Bacillus prodigiosus in all his imperable cases of sar coma, and also in those cases where he had the slightest suspicion that some of the malignant tissue was left behind after operation. He had seen some rather remarkable results following the use of the toxins. In one case of partial extirpation of a pigmented, cystic, giant celled sarcoma of the rib and involving the costal pleura, the patient had remained well up to the present time, a period of over two years. In that case a prompt recurrence was confidently expected, and that it did not take place was apparently due to the use of the toxins.

DR COLEY, in reply to a question, said he had seen deep scated malignant tumors disappear under the use of the X rays alone, but in every single instance there had been a recurrence within six months

DISINFECTION OF THE SKIN

DR ROBERT H M DAWBARN read a paper upon the above subject

Dr. Lilienthal said he thought that rubber gloves should be first filled with water and then boiled. Any bacteria that were

not killed by boiling in plain water could be destroyed by boiling in soda solution. The speaker said that, while he thought the gloves should be worn for every operation, there were certain examinations in which they undoubtedly impaired the delicate touch of the uncovered finger. As an example of this, he cited the case where a cotton swab had been left in the female bladder. In searching for this the naked finger was used for obvious reasons. In connection with the closure of wounds, Dr. Lilienthal called attention to the value of zinc plaster wherever that method was feasible.

Dr. Brewer said that the question of the infection of wounds from bacteria of the skin had come up for discussion at the meeting of the American Surgical Association in St. Louis last summer, and Dr. Harrington, of Harvard University, had made the assertion that his experiments had shown that the sweat bacteria were much less dangerous than they were formerly thought to be.

Dr. Brewer said he was strongly in favor of the use of rubber gloves. At Roosevelt Hospital they still employed the simpler methods of hand disinfection, using for that purpose bichloride solution, and sometimes the lime and soda. For the gloves themselves they used sterilized starch and talcum powder. The infection of wounds was such a complex question, and depended on so many factors, that it could not be solved by merely wearing gloves. One of the most important factors was the preliminary cleansing of the skin. Dr. Mayo had recently expressed the view that there was a certain tolerance of the skin for the micrococci that lived there, and that this tolerance was diminished by irritating the skin. In accordance with that view, he had adopted the plan of irritating the skin as little as possible. Instead of using a stiff brush, as they formerly did at Roosevelt Hospital, and applying various irritating applications, they now usually limited themselves to the use of a soap solution applied with a piece of gauze, and this method had been followed by a decided reduction in the number of cases of wound infection. During the past six months they had not had a single case of infection in a clean wound; previous to that, the longest period of immunity had been four months.

Dr. Dawbarn said that boiling rubber gloves in soda solution, as just suggested by a member, would cause them to rot. One of the objections he had to using surgeons' plaster in the

closing of wounds, as suggested by the President, was that the plaster was not transparent, and infection might occur underneath it, even if in narrow strips, without being observed. He entirely agreed with Dr Brewer that the methods resorted to to render the skin and hands aseptic should be simplified as much as possible, and it was with that object in view that he had written his paper. Upon reflection, it will be seen that neither in time nor work is the preparation of the hands increased, the certainty of asensis is greater, and the irritation of the skin is less by the plan advocated to night. He did not favor the use of starch and talcum in the rubber gloves as used at Roosevelt Hospital, because those powders did not dissolve in water or serum, and so, if enter ing a wound unobserved, through a small cut, remained as mechanical irritants. Dr Brewer's excellent results quoted, as to asepsis, were not due to the Roosevelt methods, but to avoid ance of wounding gloves The personal equation was an impor tant factor in considering the poisonous qualities of the sweat that of some persons was very toxic, while that of others was comparatively innocuous That the danger of infection increased with the irritation of the skin, whether that of surgeon or that of patient during preparation for operation, was a self evident fact Even reddening the skin should be avoided When a chemical strong enough to blister was applied to the skin, infec tion almost invariably followed frritation, likewise, from undue pressure upon the skin by buttons or plates used with retention sutures, would regularly invite suppuration at these points, by stirring up a hornet's-nest activity of the microbic dwellers just beneath, deep in the skin. This was a particularly common mistake of mexperienced operators

FOREIGN BODY IN THE KNEE JOINT

DR ROPERT H M DAWBARN exhibited a radiograph, obtained from a child six years old, that was brought to him with a history of increasing pain with slight swelling in the left knee-joint for the previous five days. There was no history nor local evidence pointing towards any wound or trauma. But the day before being brought to Dr Dawbarn, a slight chill was observed As a matter of suspicion only, the child was sent to Dr Milton Franklin, who first with the fluoroscope and then with the accom-

panying radiograph (Fig. 1) absolutely demonstrated the presence of a foreign body (needle) in the joint. It was removed without special difficulty, and the joint being then flushed first with I to 2000 warm bichloride solution, then with normal salt solution. The result was absolutely perfect, not even any stiffness of the joint remaining.

RESULT OF OPERATION TEN YEARS AGO FOR MORTON'S METATARSALGIA.

Dr. Dawbarn presented a radiograph showing the result after ten years of a resection of the head of the fourth metatarsal bone done for the relief of metatarsalgia (Fig. 2). The operation, the speaker said, was not followed by any deformity, and immediately and permanently cured the pain. It consisted in removing the head and neck of one of the two metatarsal bones that were in contact so as to nip the nerve occasionally between their spurs. The "ring-toe" (fourth) was the one most frequently so treated; but the nerve in any of the four spaces may be involved, and sometimes more than one. The late Dr. Morton's favorite operation for this condition was to cut out the entire joint: but Dr. Dawbarn said he did not see the necessity for such an extensive procedure. Another method used by some was to amputate the toe, together with the joint and its metatarsal head and neck; and, finally, some operators have searched for and excised a piece of the nerve in question. This last plan is by no means easy. If attempted, the incision must be on the dorsal surface. No cut should be made on the plantar surface, so as not to leave a scar upon which pressure would be exerted in walking. The pain suffered by these patients was often agonizing, and was chiefly complained of after the shoes were taken off.

DR. WHITMAN said that metatarsalgia was a very common affection. He was surprised to hear Dr. Dawbarn say that the pain was usually worse after removal of the shoes, since in his experience it was almost always the wearing of the shoe that induced the pain. The disability, of which the so-called Morton's toe was but one variety, was due to a depression or laxity of the metatarsal arch of the foot. The indications were to support the arch for a time, to restore the normal strength by exercises, and to wear proper shoes. He thought that operative measures, of



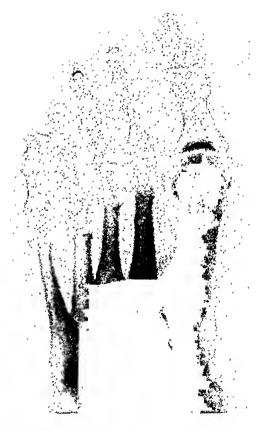


Fig. 2.—Showing condition of bones of foot ten years after excision of head of fourth metatarsal for metatarsalgia.

which that illustated was the best, were now practically obsolete as a routine treatment

DR HAYNES said his own personal experience with meta tarsalga tended to bear out Dr Whitman's statements. If he pinched his foot in a narrow shoe, the pain was severe, but was relieved by removing the constriction. He had seen the pain in these cases immediately relieved by the use of properly con structed shoes and steel insoles, to quiekly return when the support to the arch of the foot was removed.

DR DAWBARN said the trouble in these cases seemed to be due to the fact that the normal transverse arch of the foot made by the metatarsal heads was not properly maintained. When this condition was remedied by the use of a proper shoe, tight over the metatarsal bases and loose opposite their heads, the patient would be perfectly comfortable. In at least a dozen cases he had seen, the pain seemed to be more severe when walking in slippers or bare feet than in ordinary shoes The operation of choice, the radical cure of this condition, was extremely simple, taking only from five to seven minutes, was done absolutely safely and under cocaine, and insured a permanent success. In the instance in evidence to-night the shaft of the fourth metatarsal was nipped across just behind its neck by an ordinary bone forceps. As the radiograph shows, this entails a slight degree of crushing of bone, but it was done ten years ago, before the Gigli wire saw was invented,-the tool to use to day. It is indifferent which bone, on either side of the nerve being occasionally nipped by their "spurs" coming into juxtaposition, to attack. The cure is certain and instant in either case. And as the X ray picture also shows, the toe so treated does not sink back. The transverse fasciculi of ligaments opposite the heads will prevent that

It is, of course, admitted that this is only one form of this trouble,—the case shown to-night, but the cure is equally prompt and sure in all, and hence Dr Dawbarn thought it preferable to any orthopædic plan, involving years of treatment, and then without any certainty of a cure, unless the appliances are always worn

DR WHITMAN said that the case reported by Dr Dawbarn was one variety of a very common disability that existed in every grade of severity One should aim rather to restore the normal condition than to merely accommodate the part to deformity

THROMBUS OF THE LEFT COMMON CAROTID ARTERY.

Dr. Irving S. Haynes, through the courtesy of Dr. M. G. Schlapp, presented a specimen obtained from a case of epithelioma of the lip and chin, for which condition a ligation of the left common carotid was done. A segment became detached from the resulting thrombus, plugged the middle cerebral artery, and produced softening of the brain and death.

Stated Meeting, January 25, 1905.

GEORGE WOOLSEY, M.D., in the Chair.

CHRONIC TENOSYNOVITIS.

Dr. Charles H. Peck presented a woman, thirty-five years old, a patient of Dr. Royal Whitman. When first seen last November she presented an elongated tumor, evidently a tenosynovitis affecting the extensor tendons on the radial border of the hand, and another, the size of a small egg, at the bend of the elbow. The duration was about eighteen months, and the disability, of the nature of weakness and discomfort, was increasing. At operation, the two extensors of the thumb and the radial extensors were found to be involved, while that at the elbow surrounded the tendon of the biceps. The affection had been classed as tuberculous, but this diagnosis was not confirmed by the pathologist. The functional cure was apparently complete.

DOUBLE CASTRATION FOR TUBERCULAR TESTICLE.

Dr. George D. Stewart presented a man, thirty-five years old, who was admitted to Bellevue Hospital in 1901. One of his brothers had suffered from tuberculosis, and his mother had diabetes; otherwise the family history was not significant. He was not addicted to the use of alcoholic stimulants. He had never sustained any injury and has had no illness, with the exception of repeated attacks of gonorrhæa. His first attack occurred nine years before admission, and was treated for nine

months Almost every year since that time he had had attacks of gonorrhœa, or what appeared to be such, and each of these persisted for several months under treatment

Four years before admission he began to suffer from pain in the posterior portion of both testes, which disappeared while in the recumbent position Eighteen months ago he had an attack of gonorrhoea which persisted for about three months, when an abscess in the region of one testis developed. This was opened by his family physician Since then he had had a number of similar abscesses, the last one in November, 1900 After this was incised, his pain disappeared until early in 1001, when another abscess formed After this he complained very much of pain in the back and inguinal regions more severe at night

At the time of the patient's admission to the hospital, an examination showed that both testes were involved the left to a preater extent than the right. In both testicles there were discharging sinuses and the pain was constant and severe. On March 20, 1001, both testes were removed, together with the structures of the cord, following them up as deeply into the pelvis as possible, through widely opened inguinal canals. Through the incisions, the enlarged and nodular seminal vesicles could be felt, but they were not removed. The wound was closed, and healed without any trouble. Gross examination of the testicles showed that they were lobulated and studded with caseous nod ules, involving the epididymis on both sides, and that both vasa deferentia were involved. The left testis contained many pus cavities The diagnosis of tuberculosis of the testes was con firmed microscopically

Since the operation which was done nearly four years ago, the patient had gained over forty pounds in weight, in spite of his indoor occupation as a tailor. Absolutely no mental disturbances followed the operation. The patient stated that he had frequent erections, although of short duration. There were no signs of a recurrence, no frequency of micturition nor other bladder symptoms, and the urme was normal, showing no evidence of prostatic inflammation

Dr Stewart said that when this operation was done, radical measures for the relief of this condition were much more in vogue than at present, and in addition to removing the testes, removal of the seminal vesicles, which were apparently involved,

was suggested, but the patient refused his consent. To that extent, therefore, the operation in this case might be regarded as a conservative one. In cases where the testes were undoubtedly involved as well as the epididymis, and particularly where there were open sinuses, the speaker said he thought the proper and conservative operation was castration.

TUBERCULOSIS OF THE TESTICLE; EPIDIDYMECTOMY; GRAFTING OF THE VAS INTO THE GLOBUS MAJOR.

Dr. Irving S. Haynes presented a paper with the above title, for which see page 745.

Dr. John A. Hartwell asked Dr. Haynes which operation he would recommend in a case where the testicle was actually involved? Whether he would do a castration or simply scrape out the sinuses? It was very important, he thought, to substantiate the claim that these patients could be cured by a less radical operation than castration, on account of the psychical effects that sometimes followed removal of the testes. to show, however, that such mental phenomena did not invariably follow, the speaker mentioned a case that had been brought to his notice by Dr. McWilliams, of the Presbyterian Hospital. The patient was a young engineer, twenty-two years old, who ablated his entire scrotum, including both testes. The reason he gave for this when he was brought to the hospital was that he had previously injured his scrotum by running a nail into it, but he subsequently admitted that he had cut off his testes because they had proved such a source of annoyance to him by interfering with his application to his studies. When the man was seen three years later his condition was apparently normal, and he showed no mental or other symptoms, and no regret at what he had done.

DR. BENJAMIN T. TILTON said that his own experience had led him to favor a conservative method of treating these cases. He had seen a number of cases in the early stages of the disease in which epididymectomy was followed by excellent results. He recalled one case in which the sequence of events was as follows: An attack of gonorrhea was followed by a urethral stricture; dilatation of this was quickly followed by an epididymitis, and subsequently by tuberculosis of the corresponding testis, which was removed. About three years later the opposite testis became in-

volved It was first treated expectantly, and, finally, an epididymeetomy was done. This patient was kept under observation
more than four years after the last operation, and showed no
signs of recurrence of the disease. The testis appeared perfectly
normal, the patient had good sexual power, and his general health
was greatly improved.

Dr Tilton said he had never attempted to graft the vas into the globus major or into the testis, and he thought it would be a difficult matter to bring about such a union as would permit of the passage of semen. In a case that had come under his observation recently, the vas was accidentally completely divided during a difficult operation for herma. At the suggestion of Dr. Stewart, he sutured it, first passing a catgut thread through each end. An epididymius developed, but umon of the divided ends of the vas apparently took place. At any rate, there had thus far been no change in the size of the affected testis. What the ultimate outcome would be he was unable to foretell.

Dr. STEWART said there were many, including Guyon, who believed that the primary focus of tuberculosis of the testicle was in the prostate, and extended secondarily to the epididymis. The weight of clinical evidence, so far as his experience went, seemed to show, however, that the disease usually began in the epididymis, and extended on the one hand into the testis and on the other into the prostate. When the disease had actually involved the testis, and sinuses had formed, the speaker thought there could be no question as to the advisability of doing a castration, and he did not believe that even the most ardent advocate of epididy mectomy would recommend that operation under those circumstances. The only possible reason for leaving the testes under those conditions would be to prevent the possible mental disturbance that might follow their removal.

DR HARTWELL, referring to the statement in the paper that, in order to produce tuberculosis locally in animals by injecting the bacilli in the circulation of the testes, it was necessive to produce a certain degree of venous stasis, said this was interesting as opposed to the Bier treatment of joint tuberculosis, where a venous stasis was artificially produced in order to inhibit the growth of the bacilli.

Dr. Stewart said he thought the blood stasis artificially pro-

duced by the Bier method of treating tubercular joints was different from that referred to by Dr. Tilton.

Dr. Hartwell said that Dr. Willy Meyer had shown at least one case of tubercular joint disease successfully treated by the Bier method. The stasis was kept up as long as the patients could tolerate it. The principle upon which the method was based was that persons with a chronic heart lesion which produced pulmonary venous congestion rarely suffered from pulmonary tuberculosis.

Dr. George Woolsey said he had been struck by the beneficial effect of climatic and hygienic treatment in the treatment of cases of surgical tuberculosis, especially those of the genitourinary tract. The results were equally as good as those obtained by operative treatment in cases where there was some bladder or prostatic lesion.

As to the original focus in cases of tuberculosis of the testicle, Dr. Woolsey said he had been led to believe that the epididymis was more often primarily involved than some of the statistics on the subject would indicate. He recalled a possible example of a case originating otherwise in the case of a coachman who gave a history of having injured his scrotum some months previously while jumping onto his bicycle. A swelling developed on the left side, which was tapped by some physician, who then advised operation. Subsequently, when Dr. Woolsey saw him, there was some fluid in the tunica vaginalis; this was of a dark, yellow color, and thicker than the ordinary fluid of hydrocele. After its evacuation, the body of the testis felt distinctly nodular. On exposure by operation, its surface was here and there covered by raised, flattish masses resembling partly organized and decolorized film. Otherwise, the testis was apparently healthy. Some of this tissue was scraped off, and the pathologist reported that it appeared to be tubercular in character, from the presence of giant cells. The gross appearance did not confirm this opinion, and the pathological findings were not positive, and open to question.

Dr. Woolsey said he did not think it was good surgery to leave the testis when it was markedly involved, nor to remove it when the tubercular disease was limited to the epididymis. He had tried the method of injecting these cases with an emulsion of iodoform, but when sinuses and mixed infection existed, it was

difficult to obtain a cure by this method without scraping or some more radical operation

DR HAYNES said that before deciding upon the character of the operation in a case of tuberculosis of the testis the surgeon should endeavor to place limiself in the position of the patient, and do as he would be done by As to the location of the original focus of the disease, he thought the consensus of opinion was that it usually began intertubular in the connective tissue of the epididymis. The older teaching was that tuberculosis of the testicle was a deseending infection from the prostate or seminal vesicles, but the speaker thought that theory had been disproven, and that in the majority of cases the infection came through the blood vessels of the epididymis. Undoubtedly, it could occur as a deseending infection, and also, though rarely, through the lymphatic system.

The extent of the involvement in these cases Dr Haynes said, should determine the nature of the operation. If the testis was much involved, it should be removed entirely. In one of Murphy's cases, the tunica vaginalis, which was involved together with the epididymis was dissected off, and the testis itself was left behind. In many cases of unilateral castration for tubercul losss, the onogosite testis subsequently became involved.

DR CHARLES H PECS, mentioned a case that came under his observation about six months ago in which a unilateral cast ration was done for tuberculosis of the gland. At the time of this operation the opposite testis was apparently normal and remained so, as far as could be made out. In doing the castration, the cord was removed above the point of involvement. Several months after the operation, the patient developed a tubercular meningitis, which proved fatal. The speaker raised the query whether there was any special hability to a general infection from a tubercular focus in the testis.

DR HAVES said the strustics showed that unilateral castration was followed by only 46 per cent of cures. In the fatal cases death was usually the result of tuberculosis in other parts of the body. With a tubercular focus in the testis, it was just as possible for the disease to become disseminated as when the focus was situated in any other organ of the body. In closing, Dr Haynes spoke of the ease with which the operation of epididymectomy could be done under occaine unresthesia. This fact

might be used as an argument to get the early consent of patient to submit to an operation.

INCOMPLETE NEPHRECTOMY FOLLOWED BY PERSISTENT SINUS.

Dr. Charles L. Gibson presented a specimen removed from a woman, thirty-two years old, who was operated on eight months ago by another surgeon for tuberculosis of the kidney. The kidney, it appeared, was pyonephrotic, and proved so difficult to remove that it was necessary to resect a portion of three ribs before it could be taken out. Following the operation, a sinus developed, which persisted, and when Dr. Gibson reopened the wound he found the pelvis of the kidney which had been left behind by the original operator, and which was the cause of the purulent discharge.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, February 6, 1905

The President, HENRY R WHARTON, MD, in the Chair

GANGRENE OF THE SCROTUM

DR A D WHITING read a paper with the above title, for which see the ANNALS OF SURGERY for June

DR. JOHN B DEAVER said his experience has been limited to cases of gangrene of the scrotum due to extravasation of urine, he has never seen a case not due to this cause. They are quite common at the Philadelphia Hospital, where cases of obstruction of urine, and consequently extravasation, are numerous

MULBERRY VESICAL CALCULUS

DR ADDINELL HEWSON showed a mulberry vesical calculus, together with the bladder, prostate, and penus of the subject from whom it was removed. The man was an Irishman of eighty three years, an unmarried, illiterate laborer, and a moderate drinker. He died in a poor-house, but had complained of no symptoms whatever referable to the stone. The bladder was found thickened and ribbed, and partially embedded in the wall was the typical mulberry calculus shown. The bladder wall was also the site of two cysts. One was situated in front just above the pubis and was the size of an egg, the second was behind the prostate gland. That organ was enlarged and very firm and dense, but the middle lobe was almost free from involvement. Evidently there was but little interference with unnation.

CHRONIC DUODENAL ULCER; GASTROJEJUNOSTOMY.

Dr. De Forest Willard presented a specimen removed from a man, thirty-eight years of age, who entered Dr. Musser's Service, Medical Ward, Presbyterian Hospital, on account of hæmorrhage from the bowels which had lasted for three weeks. Seven months previous he had an attack of severe pain in right upper quadrant of abdomen. He was in bed two weeks; since then has had frequent but less severe attacks of same pain, and had noticed that his stools had a tarry appearance. Present attack began three weeks before admission, with sharp pain in epigastrium radiating along right costal margin to lumbar region. Nausea, gaseous distention, retching several hours after taking food, with vomiting of small quantities of material which he described as resembling tobacco juice. Appetite poor. Emaciated; extremely pallid; red blood-corpuscles, 2,500,000; hæmoglobin, 23 per cent.; stools contain blood. Examination of gastric contents showed hyperacidity, hypersecretion, and retention: no blood. Stools showed blood. Urine negative. Physical examination, tenderness to right of epigastrium. No tumor.

Diagnosis, duodenal or gastric ulcer near pylorus; possible gall-duct obstruction. Operation following day. Median incision. Hard mass with duodenum, gall-bladder, pancreas and pylorus condensed and adherent. No signs of peritonitis. Removal impossible; anterior gastrojejunostomy with Murphy button. Patient was so profoundly anæmic, hæmoglobin 23 per cent., that additional suture of the two limbs of the bowel could not be done. Operation apparently had no effect, good or bad, and he died from exhaustion three days later with continued bleeding.

Post-mortem.—No evidences of peritonitis; no leakage from gastro-enterostomy; all stitches tight and in good position. Large duodenal ulcer just beyond the pylorus, which had perforated entirely through the coats of the bowel; but before perforation, the gall-bladder had become thoroughly adherent, so that no escape had occurred into the peritoneal cavity. This inflammatory process had thickened and condensed the gall-bladder and its ducts, so that its wall was a third of an inch in thickness and it was entirely empty. The lumen of the button was filled with soft coagula, but no leakage had occurred at the stitches.

DR W W KEEN asked if examination of the blood had been made after the operation. The hæmoglobin before operation was 23 per cent, below the limit of safety as placed by von Mikulicz. Death apparently was not connected with the anæsthetic, and a blood count might have thrown further light upon the matter. The anæsthetic would reduce the hæmoglobin to some extent.

DR E B HODGE, who exhibited the specimens for Dr Williard, said no blood examination had been made after operation Small quantities of blood were passed by the mouth and by the bowel, but the patient was more comfortable for a day or two them gradually failed, and died of exhaustion sixty hours after operation

SENILE ATROPHY OF CRANIAL BONES

DR DE FOREST WILLARD presented the skull of a man, seventy years of age, who, after a fall down-starrs, became totally unconscious, with stertor, and slow pulse. Operation without ether, and with no signs of pain. Entire left side of skull found broken into a dozen pieces, brain crushed, and oozing from open inges in dure.

This great destruction was due to the extreme thinness of the cranium, which in many places was infantile in thickness and exceedingly fragile. Many fragments, an inch square, were removed, but patient never recovered consciousness. With a skull so attrophied, a very shelft injury would have caused a fracture

AN EXPERIMENTAL AND HISTOLOGIC STUDY OF CARGILE MEMBRANE

Drs A B Craig and A G Ellis, by invitation, read a paper with the above title, for which see the Annals of Surgery for June

DR W M L COPLIN said the detailed experiments were to him interesting from two points of view at From the purely scientific aspect of the question, and, 2, when viewed in the light of our knowledge regarding the healing in of foreign bodies. As a result of constant findings, the pathologist cannot regard a dead organized body as being other than an irritant when placed in the tissue. This is true even of isolated tissues in the body from which they are derived, detached periosteum or fragments.

of bone acting as irritants to the surrounding structures. Because of this action, reintroduced tissue, in essentially every instance, is eventually absorbed and replaced by newly formed tissue. An interesting point is the method by which this absorption is accomplished. Following the studies of Metchnikoff and his school, there was a tendency to lay stress upon the action of phagocytes in the removal of the foreign body. The introduction of the celloidin capsule method of studying the effect upon bacteria of the body juices has furnished evidence, however, that lytic substances are present in the body fluids. This study of Cargile membrane appears to be the first investigation of the action of lytic substances upon foreign bodies in the tissues. Ziegler and his students have investigated the exudate cells found between embedded cover glasses, but in the experiments made by Drs. Craig and Ellis no cells could enter the capsules containing the membrane. Yet the membrane was destroyed or in process of solution, though no cellular bodies were in the fluid. In view of the question as to whether this process is a fatty degeneration, the contents of the capsules were very carefully examined for fat, but none was detected. The trend of opinion now is to look to the action of lytic substances in the destruction of irritating bodies, whether they are the cells of animals or actual foreign bodies that have been introduced. The absence of applied phagocytes in the present experiments is significant. Müller, in his studies of the absorption of teeth, and others have found the destroying cells applied to the tissue to be removed where they appear to secrete a material that destroys the tissue. Here the giant cells are not applied to the membrane; disintegration, however, is proceeding, an indication that lytic substances—possessing some of the attributes of familiar enzymes—are at work. Whether or not these substances come from the cells of the new tissue is a question at present under discussion; such origin is probable. The experiments make it clear that Cargile membrane acts as a foreign body, the chromicized and unchromicized varieties appearing to be equal in this respect. The practical application of the membrane, as to its harmful or beneficial effects upon the tissues, must of course be determined by the surgeon.

Dr. W. W. Keen said that, viewing the experiments from the practical side, the surgeon finds negative facts as important as positive results. The value of the paper lies in showing that the confidence of surgeons in Cargle membrane is largely misplaced, as it does not prevent adhesions. Dr. Keen would like to see the experiments continued and applied to several other materials. Silver and gold leaf both have been used in the cranial cavity, and found still present after long periods of time, can they be used elsewhere? The value of thin rubber dam and gutta percha tissue should also be tested in this regard. Finally, the elastic rubber plaster employed by Brewer in his experiments to wrap arteries requiring repair of a solution of continuity should be tried to see if it would prevent adhesions. Good results were obtained by Brewer in the case of the arteries, though Dr. Keen is not sure that microscopic studies of the tissues were made. Continued studies will probably lead to the discovery of other substances that will be efficacious and more satisfactory in preventing adhesions.

DR. JOHN B DEAVER said he had used Cargile membrane quite extensively, in at least fifty or sixty abdominal sections, in covering denuded surfaces, stumps after histerectomy, etc. His attention was first called to the material by the paper of Dr Morris. All the patients upon whom Dr. Deaver used the membrane recovered, and, as reoperation was not necessary, the effects upon the tissues could only be surmised. The recovery of these patients was as uninterrupted as in case of those upon whom the membrane was not employed. Dr. Deaver never employs the membrane to cover raw surfaces if he can obtain a peritoneal or omental graft. From the manufacturer's stand point, the membrane employed was in every instance aseptic.

DR. CRAIG, in closing, said, in regard to the recovery of patients within whose abdominal cavity Cargile membrane was employed, that the material disappeared so rapidly it would probably not interfere with recovery. He has used the membrane in dispensary practice to cover open wounds, as ulcers, and in skin grafting after the Reverdin method, and finds it is destroyed very rapidly over the raw surfaces.

RUPTURE OF THE TENDON OF THE BICEPS FLEXOR CUBITI

Dr. W W Keen presented a patient upon whom he had operated successfully for the relief of the disability caused by this accident, and read a paper upon the subject, for which see page 746

DR. GWILYM G. DAVIS said that since reporting his series of cases he had found one in a dissecting-room subject which supported the theory of the rupture of the tendon being due to disease of that structure. In the instance mentioned the tendon where it lay in the bony groove had almost entirely disappeared. Operation is indicated in cases of this injury in healthy individuals, provided they are seen early. Reasons why more cases of this injury are not operated upon are: I. They are not seen early. 2. The disability often is comparatively slight, the other head of the muscle assuming the extra function. 3. The injury often occurs in people of rheumatic diathesis. It does not follow that severe trauma is necessary to cause rupture, as the tendon is often reduced to a mere thread. When such cases are operated upon, the tendon must be transplanted to the other head of the muscle.

DR. KEEN, in closing, said Dr. Davis's dissecting-room specimen was not subject to the criticism of specimens of supposed rupture of the muscle found in such bodies; the latter are more likely due to stretching, incident to moving the arms when rigor mortis is present, than to ante-mortem causes. In one case good results were obtained from operation three months after the injury, but if possible early operation is desirable. In cases not operated upon, the disability eventually is often quite marked. In the papers referred to are reported cases of laborers, porters, and soldiers who were rendered incompetent to perform their accustomed work. Only a few cases exhibit but little disability.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, January 16, 1905

DR L L McARTHUR in the Chair

STRICTURE OF THE ŒSOPHAGUS

DR D N EISENDRATH presented a man who began to have difficulty in swallowing with regurgitation of food about one year ago, necessitating, finally, the performance of a gastrostomy, done in New York, with apparently a good result. An esophageal bougie could not be passed beyond the level of the junction of the manubrium with the gladiolus. He had the patient swallow a large amount of bismuth, and then made a radiograph, which showed the obstruction, and to the left of it a tumor. The obstruction was a saccular one. After the passage of steel sounds the man was able to swallow milk, but at present he was feeding himself through the gastrostomy wound. This case showed the value of the X-ray and bismuth for diagnosing these conditions.

DR A E HALSTEAD stated that the tumor which showed in the radiograph of Dr Eisendrath's case probably was a diverticulum, although it might be an aneurism. The point of the obstruction was one of the favorite locations for a diverticulum Strictures also developed at that point, but in the absence of a cause for stricture, it was probable that the tumor was either a diverticulum or an aneurism. Skiagraphing these diverticuli with bismuth was not so good as passing a soft rubber tube filled with shot and then skiagraphing

DR EISENDRATH stated that he had examined his patient

repeatedly, but failed to find any evidence of aneurism or tumor, and he was, at present, unable to differentiate between aneurism, tumor, or diverticulum. The resistance encountered when passing bougies was so great that he suspected the condition was one of tumor rather than diverticulum. The patient was failing rapidly, which would point to a mediastinal tumor, probably a malignant one.

ACTINOMYCOSIS OF JAW.

Dr. William Hessert presented a girl, aged fifteen years, who a few months ago presented herself with a history of toothache and a swelling of the right jaw. A decayed tooth was visible, and the trouble seemed to be a necrosis of the jaw with cellulitis in the surrounding tissue. He operated, but failed to find pus. There was a hard, indurated mass, the bone being denuded. The wound healed up, but the tumor increased in size. Later, small areas of softening appeared, three or four-of which he incised, and in the discharge he found the ray fungus. He put the girl on large doses of potassium iodide, and she was improving steadily. The mass had diminished in size about one-half, and she could open her mouth better than ever before. She was taking as high as eighty grains of the iodide a day, taking it for alternate weeks. There had been no glandular involvement.

DR. W. M. HARSHA said that he had seen two cases of actinomycosis in the past year, and the tissue around the brokendown masses was very hard, almost gristly. That condition was so marked that he considered it a valuable diagnostic sign. He also mentioned the value of following the operative procedure with exposures to the X-ray, inasmuch as it would remove, or at least aid in removing, these growths.

METASTATIC RENAL ABSCESSES.

Dr. Hessert presented a man who some years ago had a necrosis of the right femur, necessitating its amputation a few inches below the trochanters. Later, he had some abscesses of the back. The trouble in the jaw was diagnosed as an osteomyelitis. An incision was made and a small amount of pus was evacuated. The patient did well for about ten days, when he began to complain of pain in the right lumbar region. Re-

peated examinations of the urine finally showed a small amount of pus. The right kidney was increasing in size and became tender. The general condition of the patient was indicative of sepsis, and a diagnosis of suppurating right kidney was made. The kidney was removed and showed a number of abscesses in the cortical portion. The pus was found to contain the staphylococcus pyogenes aureus. The patient did well for a while, but finally complained of pain in the left kidney, which became large and tender. Pus showed in the urine. An incision was made and many abscesses were found in the cortex of the kidney. These were evacuated with the finger, the wound was packed, and the patient made a slow but uneventful recovery. He was gaining in weight

DR EISENDRATH extirpated a kidney about five years ago for ascending pyelonephritis with multiple abseesses in the kidney, and, later, doubted whether he did not make a mustake in doing so Fortunately, the patient recovered without further symptoms. He said that Weir, of New York, called attention to the fact that surgical kidney frequently was a unilateral process, whereas, in the ease of multiple metastatic abseesses the condition was quite likely to be bilateral. He referred to an article which appeared in the Munchener medicinische Wochenschrift, in which the writer spoke of opening the abseesses, evacuating and draining the infected kidney. His own experience, this article, and Dr. Hessert's case would lead him, in the future, to adopt that procedure because the kidney was known to have great recuperative powers.

DR A H FERGUSON referred to a case he reported some years ago of multiple abscesses of the right kidney, where he excised some abscesses and opened others. The other kidney became involved two years later, but the patient refused operation and died from sepsis. In the kidney operated on no abscesses developed subsequently, leading stitingth to the practice of not extirpating such kidneys. The first thing to do in such cases, whether of ascending or metastatic variety, was to ascertain the condition of the urine from both kidneys. It furnished valuable proof of the condition of the other kidney, and also indicated the time of interference. His own practice was to open such kidneys and evacuate all the abscesses, draming externally until there was no more pus in that kidney. The progress of the second kidney.

in Dr. Hessert's case, he said, would indicate that, if the same treatment had been pursued with the first kidney as with the second, there would now be more kidney secreting power.

BRAIN TUMOR.

Dr. John E. Owens presented an account of a cerebral sarcoma removed by operation, for which see page 655.

Dr. Eisendrath said that one of the difficulties encountered in performing these operations was the bleeding from the scalp. In a case he operated on for Jacksonian epilepsy, the bleeding became so severe that the patient was almost exsanguinated. Another point was the hopelessness of these cases, especially the sarcomata, because they were not encapsulated. In his case he succeeded in relieving the intracerebral tension, but the other symptoms did not seem to be much relieved. A third point was the frequency of occurrence of hernia cerebri. He had seen a number of cases in which it was almost impossible to keep the bone flap in apposition with the remaining portions of the skull.

DR. FERGUSON stated that he had operated on quite a number of such cases, but in none of them had he any such good results as Dr. Owens had in his case. He merely succeeded in securing temporary relief from the headache. The hernia of the brain became enormous. He had never failed to control the hæmorrhage from the scalp without the use of the elastic ligature, which he discarded long ago. He depended entirely on a sufficient number of hæmostats and pressure. In one case, however, he had a fatal hæmorrhage from the diplöe. In spite of packing dermatol into the diplöe, crushing the bones together, and packing the wound, the hæmorrhage continued. Although a large flap was useful, he said that he had discarded it, making two or three small flaps with their bases in different directions, and it appeared to be an advantage over a large flap.

DR. WAGNER said that hæmorrhage from the flap occurred more often than was supposed. He mentioned a device published a year ago which was very simple and reliable. It consisted in putting in two rows of sutures, between which the incision of the scalp was made. These sutures were left in place until the wound had healed. They had not been found to interfere with healing by shutting off the blood-supply.

DR HALSTEAD said that he had made use of this method fifteen years ago under the direction of Dr Jacob Frank, who claimed to be its originator He had discarded the method, however, because it took up too much time and did not give much security against hæmorrhage He had found that, as a rule, the hemorrhage could be controlled with artery forceps and pressure A few years ago he operated on a case of brain tumor at the base of the skull for the purpose of relieving the pressure symptoms He made a trephine opening and evacuated the ventricles The intracranial pressure increased enormously, so much so that the brain tissue was forced out through the small opening through which the fluid was withdrawn from the ventricles By tapping the ventricles, the patient's condition was improved and the pressure was relieved. He learned later that this was not an unusual complication of such operations,-in fact, the acute cedema of the brain sometimes caused death. His patient lived for a few months He said that, to relieve intracranial pressure, an opening should be left in the skull The osteoplastic method was contraindicated

DR STEELE stated that, while the ultimate outcome of Dr Owens's case was as yet in doubt, the temporary relief and the prolongation of the patient's life were of value. He referred to an intracerebral sarcoma, about two inches in diameter, which he published about two years ago. The location of the tumor in the motor area was easy, and its removal was not difficult. While there was no difficult in controlling the hamorrhage from the scalp, the hamorrhage from the longitudinal sinus was severe. He packed in an abundance of iodoform gauze and succeeded in controlling the hamorrhage. The patient was still alive after twelve years.

Da Owens said that berma of the brain could be prevented by making an opening in the dura at the base of the flap, when that was possible. That could not be done in his case because of the natural opening at the top made by the tumor. The hæmorrhage in his case was exceedingly troublesome, but encircling the scalp with the elastic ligature proved very satisfactory. The blood vessels were much dilated, which, of course, favored the hæmorrhage. There was not so much brain tissue in a cerebral herma as was often supposed. As a rule, it consisted of granulation tissue and a little brain tissue.

There was also considerable infection in his case, and, as he wished to get a union of the bone flap in part, at least, he had to make use of the gold plate. In pressing it down, some pus came from the depths of the wound. This was carefully dipped out and, fortunately, the case got along nicely.

HYDROCELE IN THE FEMALE.

Dr. A. E. Halstead and Dr. Charles P. Clark read a paper with the above title, for which see page 740.

DR. OCHSNER said that he had never encountered a sacculated body in hydrocele in the female. He emphasized the value, so far as diagnosis was concerned, of the points brought out by Dr. Halstead; but after one had made a diagnosis of this condition a few times, it was not a difficult matter. In one case the dumb-bell-shaped hydrocele gave him considerable trouble, because it seemed to be a hernia filled with peritoneal fluid in connection with a tubercular peritonitis. The filling up of the outer sac seemed to be similar to one he had seen previously in a case of tubercular peritonitis complicating hernia, and the quantity of fluid was sufficient to give rise to the error in diagnosis.

Dr. McArthur failed to see how it was possible to differentiate between an empty hernial sac and a hydrocele in a case where the canal of Nuck contained fluid which might be emptied into the peritoneal cavity. It might be one or the other condition. A few years ago he operated on a case that he supposed was one of hernia, and which answered to this descrip-It consisted of a tumor, tense, impulse on coughing, slowly reducible, appearing on standing, disappearing on lying down. On opening the tumor he found it to contain a clear straw-colored fluid, which, on examination, was found to contain one-fourth of I per cent. of urea. The tumor had a small communication with the peritoneal cavity, through which the omentum could be seen trying to escape. He considered that as much a hernia as a hydrocele, in which the hernial sac was probably congenital, but the neck of the sac just too small to permit of the escape of the solid abdominal contents. He had sections of the sac examined by Dr. Zeit, who reported that it probably consisted of an offshoot or diverticulum of some of the hollow abdominal viscera because it was lined with epithelium, and outside of this were muscularis and serosa. The patient made a perfect recovery

DR. HALSTEAD said that congenital hernia did not mean that there was either gut or omentum in the sac at the time of birth. The hernia might not occur for twenty five years, and yet, when it did occur, it was a hernia. But until something came down it was not a hernia. There were two cysts in this region,—one an accumulation of fluid in an old hernial sac, which was not a hydrocele, another, a cyst in the round ligament, communicating sometimes with the peritoneal cavity. Several such cases were on record, and that, he thought, might explain Dr McArthur's case.

CALCULI IN COMMON DUCT AND BILIARY PASSAGES

 $D_{R}\ L\ L$ McArthur presented the history of a case of stone in the common duct

The patient, M. G., aged twenty five years, clerk by occupation, Austrian by birth was admitted to the Michael Reese Hospital, November 28 1904. Family history Father living, mother dead, cause of death unknown. One brother and sister living Family history negative. Past history. Patient always well and strong

Present trouble began ten days ago Patient states that he caught cold ten weeks previous to onset. Onset was sudden, with severe cramp like pain in the right hypochodriae region Pain localized and aggravated by deep inspiration and coughing Tenderness on pressure. No interus. Had a chill third day after onset, followed by elevation of temperature. No nausea or vomiting, although an emetic was given to induce vomiting Appetite good until late. Bowels usually regular. No hæmate mess, no meléna. Coughs some, the cough being of a dry hacking character. Slight expectoration, no hæmoptysis, no night sweats. No urmary trouble, no venereal history, drinks some, but not to excess.

When patient entered the hospital, the physical examina tion showed only a slight tenderness in the epigastric region just below the ensiform cartilage. The skin chocolate-colored Spleen palpable, temperature, 102.4° F (rectal), pulse, 92, and respirations, 20 Leucocyte count, 10,300. During his first

ten days in the hospital, the patient's temperature ranged from 99° to 103° F. On the tenth day he had a chill which lasted fifteen minutes, followed by a sudden rise of temperature to 105.6° F., dropping to 102.6° F., in an hour after being sponged, the pulse ranging all the time from 70 to 90. Six days after coming into the hospital, the patient had an attack of severe epigastric pain, with a slight icteric hue to the skin. A small round tumor, about the size of an egg, was felt in the region of the gall-bladder. The rectus muscle was tense on the right side. There was no radiation of pain to the shoulders, but it passed to the back and in the lower thoracic region. On the twelfth day he had another chill, followed by a temperature of 105.6° F. Leucocyte count, 19,000. On the following morning he was operated. Urinary examination showed albumen, bile, hyaline, granular and epithelial casts.

At operation, a sausage-shaped tumor was found in the location of the common duct. It was hard and firm, and felt like the displaced bodies of the vertebræ, but it was movable. It contained many stones tightly impacted. The gall-bladder was aspirated and a bile-stained fluid evacuated. The common duct contained a mucopurulent fluid having the appearance of appendicitis pus. With the fluid numerous stones of good size and resembling stones usually seen in the gall-bladder were washed out. One hundred and forty-six stones were removed. The patient died on the third day after the operation from sepsis. On section of the liver, stones were found in all the biliary ducts.

Gross specimen of the liver was shown.

DISLOCATION OF THE ATLAS.

DR. D. N. EISENDRATH showed a specimen which illustrated the mechanism of rotary dislocations of the atlas upon the axis. It was obtained from a boy who was thrown from a bicycle, striking upon his head, and who died within a few minutes after entering the hospital. Death had been caused by compression of the cervical portion of the spinal cord through the slipping backward of the odontoid process. The specimen illustrated the fact that this variety of dislocation, which probably is one of the most frequent, causing a tearing of the ligaments binding the articular processes of the atlas and axis together, permitting of their rota-

tion upon each other At the same time, the transverse ligament was torn, allowing the odontoid process to slip backward

SYPHILIS HEREDITARIA TARDA.

Dr. Eisendrath showed a boy, sixteen years of age, with a marked enlargement of the left tibra, greatly resembling a periosteal sarcoma. The X-ray picture showed a greatly thickened periosteum, and inquiry revealed the probability of syphilis in the parents. The case was one of those forms of hereditary sphilis which do not begin to show themselves until the age of puberty, and at that time affect especially the periosteum of the long bones, to which Fournier has called attention. The presence of nocturnal pains led to the suspicion of syphilis. The administration of iodide of potassium in five-grain doses for ten days caused the disappearance of these might pains, and a diminution in size of the affected bone.

PRIMARY TUMOR OF THE TESTIS, METASTASIS IN HEAD OF FEMUR.

DR EISENDRATH showed an X-ray of the pelvis and both femora, in which the head of the left femur was entirely destroyed through the presence of a metastasis from a primary tumor of an undescended testis. The primary growth had occurred in an undescended testis, in association with symptoms of strangulated herma. On operation, which was performed by Drs Leeming and Eisendrath, the symptoms of strangulation were due to a torsion of the undescended testis, which was greatly enlarged and hæmorrhagic. The tumor was not suspected to be malignant. About a year later the patient complained of severe pain in his left hip, with nocturnal rise of temperature, and shortening of two inches. The X-ray showed the destruction of the head of the bone, and, on opening the hip joint, a number of grape-like tumor masses were found which showed upon microscopical examination the nature of the primary growth, that is, a mixed tumor of the testis. The case was of especial interest, showing the tendency of some secondary tumors to leculize in the head of the femur.

REVIEWS OF BOOKS.

HAND-BOOK OF SURGICAL ANATOMY. By G. A. WRIGHT and C. H. Preston. Philadelphia: P. Blakiston's Son & Co.

In this little volume of 200 pages the authors have grouped together a series of anatomical facts, and with each of these they have associated a surgical condition. Although there is nothing original in such a work, the authors have selected the most important points in surgical anatomy, and have dealt with them in such a concise manner that the student may obtain much valuable knowledge in a short space of time. This method of intermingling the study of anatomy and surgery is evidently followed in the Manchester School of Medicine in England, for the students of which institution this book is intended as an aid.

WALTER A. SHERWOOD.

REGIONAL MINOR SURGERY. By GEORGE GRAY VAN SCHAICK. Second Edition, Enlarged and Revised. 228 pp., Cloth. New York: International Journal of Surgery Company.

The first edition of Van Schaick's "Regional Minor Surgery" was reviewed in the July number of the Annals of Surgery for 1903. The reviewer can emphasize again what was said of the book at that time.

The text has been subjected to a complete revision, and additional material has been included so as to bring it up to the present date. That the demand has so soon made necessary a second edition evidences the deserved favor with which this little volume has been received.

WALTER A. SHERWOOD.

Awarded
60L0 MEOAL
Longulation
Purchase
Exposition

LISTERINE

Awarded
GOLO MEDAL
Louisiana
Purchase
Exposition

A non toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution sightly, pleasant, and sufficiently power ful for all purposes of asepsis these are advantages which Listerine embodies

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine

LISTERINE DERMATIC SOAP

An antiseptic detergent for use in the antiseptic treatment of diseases of the akin.

Listerine "Dermatic Soap contains the essential antiseptic constituents of eucalyptis (1%), mentha, gaultheria, and thyme (each ½%), which enter into the composition of the well known antiseptic preparation, Listerine, while the quality of excellence of the soap stock employed as the vehicle for this medication will be readily apparent when used upon the most delicate skin and upon the scalp Listerine "Dermatic' Soap contains no animal fats, and none but the very best regetable oils, after its manufacture, and before it is "milled" and pressed into cakes, a high percentage of an emollient oil is incorporated with the soap, and the smooth, elastic condition of the skin secured by using Listerine "Dermatic" Soap is largely due to the presence of this ingredient. Unusual care is exercised in the preparation of Listerine and added to the soap after it has received its surplus of unsaponified emollient oil, they retain their peculiar antiseptic viriues and fragrance

A sample of Listerine Dermatic Soap may be had upon application to the Manufacturers—

Lambert Pharmacal Company, St. Louis, V. S. A.

Awarded
6010 MEDAL
Louisiana
Purchase
Exposition

Awarded

60L0 MEDAL

Louisiana
Purchase
Faposition

Garrigues

An entirely new work

Gynecology

By HENRY J. GARRIGUES, A.M., M.D.,

Gynecologist to the St. Mark's Hospital, New York City; Consulting Obstetric Surgeon to the New York Maternity Hospital; Honorary Fellow of the American Gynecological Society; formerly Professor of Gynecology and Obstetrics in the New York School of Clinical Medicine; Professor of Obstetrics in the New York Post-Graduate School and Hospital.

Octavo. 462 pages. 328 illustrations, Cloth. \$3.00

R. GARRIGUES'S ability as a gynecologist and writer is well known, and in this entirely new work he has devoted the largest share of his attention to *Medical* Gynecology.

To the practitioner desiring to acquaint himself with the present status of modern gynecology, and the physician willing to refresh his memory or learn the latest details in treatment for a particular case in hand, the book will appeal with peculiar force.

Dr. Garrigues's exceptional facility for imparting knowledge and writing concisely is best exemplified in this his latest work. No space has been given to the history and progress of the science and practice of gynecology, no case histories nor bibliographies have been introduced as padding, but the space so saved has been devoted to differential diagnosis and treatment.

The author teaches how to recognize the nature of the disease or condition, and how to attack it with medical, electrical, or surgical remedies. Minor operations which the general practitioner is likely to undertake are described with minute detail. In regard to the others, the chief features are indicated.

The work embraces the abnormalities of all the organs in the female pelvis, inclusive of the urinary organs and the rectum, excepting those conditions which are connected with pregnancy and childbirth, described in the author's work on obstetrics.

The plan is laid in such a way that the leader is gradually led from the simple and easy to the complicated and difficult. For this purpose the book is divided into a general and special division. In the latter the anatomical order is followed, beginning from the outside. For practical purposes, special chapters on hemorrhage, leucorrhæa, and sterility are added.

The text is elucidated by a large number of illustrations, many of which are original and based upon the author's own researches, dissections, and operations.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having—sent on request
When writing, please mention Annals of Surgery,

Nurses' Guide



TO

Surgical Bandaging and Dressing Cloth, 75 cents

By WM. JOHNSON SMITH, F.R.C.S.

Principal Medical Officer, Seamen's Hospital, Greenwich.

TN writing this small work, the author has endeavored to provide a ready and complete pocket reference book for students and nurses in surgical wards. The scientific principles upon which the modern treatment of wounds is based are fully explained, so that the instructions in dressings and bandaging may be intelligently followed. In order to make these explanations as clear as possible, the volume has been profusely illustrated.

ONTEN

111

- I THY MODERN TREATMENT OF WOUNDS II WOUND INFECTION AND SEPSIS
- III ANTISEPTIC AND ASEPTIC SURCERY

aseptic dressings.

after the operation.

- IV ANTISEPTIC TREATMENT OF WOUNDS

 —Sterilization by heat. Antiseptic and
 - V THE OPERATING ROOM AND ITS CONTENTS
- VI PREPARATIONS FOR A SLAGICAL OPER ATION—Preparation for an operation in a private house Duties of the nurse
- VII TREATMENT OF WOUNDS —Inflamed or septic wounds. The value of the climeal thermometer in cases of recent wounds.
- VIII TREATMENT OF BURNS AND SCALDS

- IN TREATMENT OF ULCERS

 N BANDAGING —The roller bandage
- VI COMPOUND FORMS OF ROLLER BANDAGE.

 —The triangular bandage Fixed or
 - "movable" bandages
 KNOTS AND STRAPPING —Strapping
- VIII SPLINTS -For the upper limb For the lower limb Flexible and moulded
- spirits. First aid or emergency spinits.

 VIV NURSING IN CASES OF INJURY Injuries to the head Injuries to the chest.

 Injuries to the abdomen Fracture of
 - the spine Injuries to the upper extremity Injuries to the lower extremity

 NV THE TEMPERATURE AND THE PULSE
 - INDEX

J. B. Lippincott Co. Philadelphia · since 1792 London · . · since 1872

Our new Catalogue is well worth having-sent an request

INTERNATIONAL CLINICS

A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, Pediatrics, Obstetrics, Gynecology, Orthopedics, Pathology, Dermatology, Opthalmology, Otology, Rhinology, Laryngology, Hygiene,

And other topics of interest to Students and Practitioners by leading members of the medical profession throughout the world.

Edited by A. O. J. KELLY, A.M., M.D., Philadelphia, Pa., U. S. A.

With the collaboration of WILLIAM OSLER, M.D., Baltimore; JOHN H. MUSSER, M.D., Philadelphia; JAMES STEWART, M.D., Montreal; JOHN B. MURPHY, M.D., Chicago; A. McPHEDRAN, M.D., Toronto; THOMAS M. ROTCH, M.D., Boston; JOHN G. CLARK, M.D., Philadelphia; J. W. BALLANTYNE, M.D., Edinburgh; JAMES J. WALSH, M.D., New York; JOHN HAROLD, M.D., London; EDMUND LANDOLT, M.D., Paris; RICHARD KRETZ, M.D., Vienna; with regular correspondents in Montreal, London, Paris, Berlin, Vienna, Leipsic, and Brussels.

Illustrated in colors and black and white. Cloth, \$2.00 Octavo. 300 pages per volume. per volume; \$8.00 per year. Half leather, \$2.25 per volume; \$9.00 per year.

CONTENTS, VOL. I, SERIES 15, APRIL, 1905.

TREATMENT

The Treatment of Cardiac Asthma. By P. Merklen, M.D.

The Treatment of Cirrhosis of the Liver, Unusual Syphilis, Tuberculosis, Suffocating Catarrh, and Mucomembranous, Enterocolitis. By Albert Robin, M.D.

Therapeutic Indications in Infected Cholelithiasis. By A. Chauffard, M.D.

MEDICINE

The Carbohydrates of Human Urine, in Health and in Disease. By Carstairs Douglas, M.D. The Eye and the Hand in the Diagnosis of Heart Disease. By Jas. J. Walsh, M.D. The Early Diagnosis of Heart Disease in Children. By J. Porter Parkinson, M.D. Aortic Stenosis; Adherent Pericardium. By Morris Manges, M.D. Intestinal Adhesions and the Report of a Case Illustrating Elasticity of the Hepatic Support (Hopatoptosis). By A. L. Benedict, M.D.

SURGERY

Skin Grafting in the Late Treatment of Severe Burns Involving Extensive Areas of Skin. By Archibald Young, M.B.

The Starvation of Malignant Growths by Depriving them of Blood Supply. By Robert H. M. Dawbarn, M.D.

A New Operative Method for the Total Extirpation of the Larynx. By Francesco Durante, M.D. The Treatment of Knee Joint Disease. By Russell A. Hibbs, M.D. The Treatment of Glenard's Disease. By A. Ernest Gallant, M.D.

NEUROLOGY

Morphinomania, Cocomania, and General Narcomania, and Some of their Legal Consequences. By Charles K. Mills, M.D.

A Case of Cerebellar Tumor. By J. Walter Carr, M.D.

Two Cases of Ocular Palsy in both of which the Paralysis was Probably Dependent upon a Lesion in the Neighborhood of the Sphenoidal Tissure. By Edwin Branwell, M.B.

OBSTETRICS

Anterior and Posterior Parietal Presentations of the Head in Slightly Flattened Pelvis. Robert Jardine, M.D.

PROGRESS OF MEDICINE

Treatment. By A. A. Stevens, M.D.
Medicine. By David L. Edsall, M.D., and Wm. B. Stanton, M.D.

Surgery. By Joseph C. Bloodgood, M.D.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

When writing, please mention Annals of Surgery. 20

NEW! IMPORTANT!

Every Physician and Hospital should have THE RIVA ROCCI

SPHYGMOMANOMETER



Modified by DR. H. W. COOK

Plain form, for hos- \$6.50

Portable form, with jointed manometer, in small plush-lined case for gen- \$8.50 eral use

MANUFACTURED SOLELY BY

EIMER & AMEND, 205-211 Third Ave. New York

NEW EDITION

LATEST AND BEST

Lippincott's Medical Dictionary

Half Morocco, \$4.50, net With Patent Thumb Index, \$5.00, net

J. B. Lippincott Company, Philadelphia since 1792

Our new Catalogue is well worth having-sent on request

KASAGRA

$oldsymbol{ ext{VERY}}$ $oldsymbol{ ext{ACTIVE}}$

Use Kasagra in the same-sized doses as the bitter fluid extract of cascara sagrada—their activity is equal.

Kasagra is a palatable fluid extract of cascara, undeprived of the valuable tonic principle. We believe it is the only palatable fluid cascara containing this

principle.

Occasionally cascara is employed as a simple laxative: but usually its tonic effect on the intestine is desired. In either case Kasagra is always completely satisfactory. Its activity—derived wholly from cascara—has not been sacrificed to palatability. Only the choicest two-year-old bark is used in its manufacture.

It is the *most active* palatable preparation—the *most palatable* active preparation.

Sixteen years' use by the medical profession has established it securely as the leading cascara preparation of the world.

Druggists know it only as Kasagra—therefore the only way to be sure of getting it is to write *Kasagra* on your prescription.



DETROIT, MICH. U.S.A. WINDSOR, ONT. LONDON, ENG. NEW YORK. CITY.

AN ELIGIBLE COMBINATION

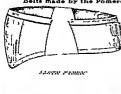
A number of years ago Dr. James J. Sulli van (University Medicul College) New York City, applied the remark In Fligible Combination to a then new preparation of well known synergetic remedial agents. It is almost unnecessary to state that the preparation to which he referred is now well and favorably known as Autikanoma and Codeme Tablets each tablet containing i ar codeme and 49 ers untikamma I fact a lack should not be overlooked in that the colleme to the this tablet is specially prepar tail purified is non Constipating a 11 expote 1 ce il il Tiese . . so ne of the part cultril al artigeous fest ures of the Inthan 1 (1 meed Company's coderne an I are well worth b ar ng m min !

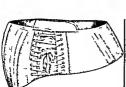
In the harrissing cough of phthese or in the pain of pleuritis in the painful sensation accompanying bronchitis when the tubes are dry and irritable-as they it hally are-the blending of the two drugs composing antikammand C lone Tiblets will n the found wanting in action but will give re-nite that are gratifying to both the patient and the inedical attendant. This tablet is a sedative to the respiratory centres in both acute and chrome di orders of the lungs

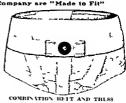
SEPTIO HANDS AND ARMS

Continued application of corrosive subhmate to the skin will in many cases result m a had dermatitis. This may be avoided by using Sulpho-Napthol strength one t a spoonful to a quart of hot water Have the patient seak the afflicted part in this lor one half hour, keeping the solution as hot as can be borne If the part has been operated on and drunge established clean out the incisions by forcing the solution through with a syringe Afterwards if it is desira ble to use wicks for drunage, gauze soaked in the same strength solution will be found superior to the iodoform wicks so commonly After this thorough cleansing and sorking apply plenty of gauze as most as noccible using a solution of the same strength use oiled paper or silk to confine the heat and moreture, then apply an outer covering If this can be done twice a day the re-ult will be surprisingly satisfactors and recovers rapid If, however it is only possible to change the dressing once every twenty four hours these directions being carefully followed the patient will suffer no meonvenience and the parts will be very clean and free from odor while the dressing will remain moret and comfortable

FOR EVERY CONDITION REQUIRING ABDOMINAL SUPPORT









LINEY MESH

ALI PLASTIC

POMEROY COMPANY 17 Union Square, New York 414-416 Fulton St., Brooklyn When writing please mention Aveals or Surgery

DEFENSE OF MALPRACTICE

SUITS IS GOOD

But the Busy Doctor also wants

PROTECTION

The Fidelity and Casualty Company of New York

Defends its clients against any such Proceedings at its Own Cost, and if Damages are awarded will PAY them.

Special Accident and Health Insurance for Physicians, Surgeons, Dentists, etc. **EVERYWHERE**

QUININE WITHOUT EBRIETY.

When two such well-known drugs as antikamnia and quinine are offered to the tikamnia and quinine are offered to the profession it hardly seems necessary to indicate the special classes of affections which call for their use. Antikamnia is unquestionably a perfect substitute for morphine for internal administration. It has complete control over pain, while it is free from the undesirable after-effects of the alkaloid of opium. In cases of malarial fever the combination of antikamnia and quinine should be given as a prophylactic and cure. For all malarial conditions, quinine is the best remedy we have. But, associated with this condition, there is always more or less pain, and antikamnia will remove these unpleasand antikamnia will remove these unpleasant symptoms and place the system in the best condition for the quinine to do its work. There are a number of ailments, not closely defined, which are due to the presence of malarial poison. All such conditions are malarial poison. All such conditions are greatly benefited by the use of "Antikamnia and Quinine Tablets," each tablet containing 2½ grs. antikamnia and 2½ grs. sulph. quinine. The antikamnia in these tablets not only relieves the pain, but prevents the ebriety or ringing sensation produced when quinine is administered alone. In headache quinine is administered alone. In headache (hemicrania), in the neuralgias occurring in anomic patients who have malarial cachexia, and in a large number of affections more or less dependent upon this cachectic condition, the regular administration of these tablets is indicated .- Medical and Surgical News.

LOCAL ANESTHESIA.

Writing on "Local Anesthesia," Horatio C. Wood, M.D., LL.D., Philadelphia, says the following:

"The suggestion of Barker that eucain be substituted for cocain seems to have brought infiltration anesthesia almost to the high water mark and has been followed out in Philadelphia by various surgeons with great satisfaction. The plan is readily carried out as follows: Powders are kept in stock in the operating room containing 0.02 grm. (3 grains) of Beta-eucain and 0.8 grm. (12 grains) of pure sodium chloride. At the time of the operation one such powder is dissolved in 100 cc. of boiling distilled water, and when it is cooled sufficiently 1 cc. of adrenalin chloride solution (1:1000) is added; 100 cc. of the resulting liquid contain substituted for cocain seems to have brought added; 100 cc. of the resulting liquid contain 3 grains of Beta-encain and 0.015 grains of adrenalin chloride. The whole 100 cc. may be used at one infiltration anesthesia, but according to Barker from 50 to 60 cc. usually suffices, even in such considerable operations as for the cure of hernia, castration. It is of course essential that the syringe used be aseptic and the surgeon should always employ the platinum needle with an iridium point, which can, without injury, be disinfected in the flame of an alcohol lamp immediately before use."—Excerpted from the Therapeutic Review, Philadelphia, Feb, 1904.

THE TREATMENT OF MENSTRUAL DISORDERS

By GEORGE S WALKER, M D , Staunton, Va First Assistant Physician in charge of Female Department Western State Hospital Staunton Va etc

In an institution like the bospital with which I am connected we naturally come face to face frequently enough with the question of treating the amenorrhea that is noted as an accompaniment of mental discuss, and for a long time I have been experimenting with various therapeutic agents recommended for the treatment of menstroid disorders without obtaining perfect satisfaction from any, until I tried the method of treatment which I am about to describe

What I was looking for was a safe and efficient emmenagous which gave powitive resultain cases of amenorrhea, dyemenorrhea, and suppressed menistration without either exiting or depressing the patient, without causing any disturbances on the part of the digestive tract, or the urinary tract, each as are met with in the use of most of the reme diese classed as einmenagones

Case I -Miss V F Aged twenty one vears Was admitted June, 1901 She said that she had not menstruated for nearly a year, and attributed her suffering in body and mind to this fact. She was despondent. and on the verge of committing suicide The reflex effects of the uterine disturbance were also manifested by the derangement of function in nearly all the organs was entire loss of appetite and practical ces sation of digestion, accompanied by pain after eating In October, 1901, I began to give her two capsules of Ergo Apiol (Smith) three times a day until after her expected periods without any effect During the month of November I gave her two capsules three times a day, and continued the treat ment until December 12th 1901, when her menstruation returned in a perfectly normal manner No unpleasant after-effects what ever were noted at any time during this treatment She improved both mentally

charged cured when the menstrual function had been re-established.

Case II—Miss M B S Aged twenty four years llas been suffering from amen orrhea for a year, which persisted in spate of all treatment. She was melancholy, and

had a very poor appetite and other disturbances due to her suppressed menstruation In November, 1901, I began giving her two capsules of Ergo Apiol (Smith) three times a day I continued this treatment without any appreciable effect, except that the pa tient seemed to feel more comfortable, and at certain times during the month she experi enced the subjective sensations accompany ing the onset of menstruation Finally, her menses returned on April 21st, 1902 menstruction was perfectly normal week before the next succeeding period I gave her two capsules of Ergo Apiol (Smith) three times a day, and when the time came for the onset of the flow it appeared in a normal manner The remedy was continued in doses of one capsule three times a day while the flow lasted Since the re-estab hishment of her normal function the patient has gained both mentally and physically, and regained her mental balance and her usual cheerfulness, so that she was discharged cared



Catalogue H.
THE 20TH CENTURY
POLYCLINIC CHAIR
Manufactured by

Manufactured by THE PERFECTION CHAIRCO, INDIANAPOLIS, INO.

The WALKEASY

Our Art Catalog contains valuable informaon on Care and Treatment of Stump Preparatry to applying an Art Limb How Soon to

SAL HEPATICA.

Lifervescent uric acid solvent and chminator stimulates liver tones nii intestinal glands pu rifies alimentary tract and improves digestion assimilation and meta bolism It is practically specific in rheumateum gout and billous attacks Sal Hepatlea has no equal for eliminating toxic products from in testical tract or blood and correcting vicious or clogged functions





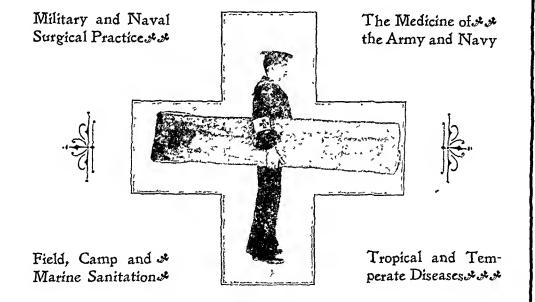
When writing please mention ANNALS OF SURGERY

JOURNAL OF THE ASSOCIATION Of Military Surgeons of the United States.

EDITED BY

James Evelyn Pilcher, M.D., Ph.D., L.H.D.,

Major and Brigade Surgeon of United States Volunteers, Captain, Retired, In the United States Army.



The Journal of the Medical Officers of the American Public Services in Particular, but of the Highest Interest and Value to Every Practitioner.

Published Monthly, \$3.00 a Year.

Free to Members of the Association of Military Surgeons of the United States.

The Association of Military Surgeons,

DEPARTMENT OF PUBLICATION,

Carlisle, Pennsylvania.



At all booksellers or will be sent postpaid by

J. B. LIPPINCOTT COMPANY

PUBLISHERS PHILADELPHIA

THE HIGH PRESSURE TYPE

Too much work. Too little recreation Inactive physical habits Result-Nerves, Insomnia, and Impending Collapse

Goldbeck's Malt Extract

a ds the digest on, quiets the strained nerves, and imparts placitity of disposition

By prescribing Goldbeck's you ensure the patient's co operation—this preparation being agreeable to the most fastidious taste.

Fenerally weeful to Nurse.

Especially useful to Nursing Mothers

JOHN F. BETZ & SON, Limited Crown and Callowhi 1 Streets PHILADELPHIA, PA

Students Wanted

to sell "ANNALS OF SURGERY" to the profession.

Liberal Commission.

Write for particulars

ANNALS OF SURGERY,

227 South Sixth Street, PHILADELPHIA

HILADELPHIA

Nerve Disorders.

If your patient suffers from THE BLUES (Nerve Exhaustion), Nervous Insomnia, Nervous Headache, Irritability or General Nervousness, give one teaspoonful four times a day.

Neurilla is prepared from Scutellaria and Aromatics, and is absolutely harmless even under prolonged use.

Dad Chemical Company, . . New York and Paris.



"Rest and Change of Scene."

"Sign of the Best"

Follow your own prescription. Take a vacation. Join the physicians who will go West to the Portland Exposition this summer over the Northern Pacific Railway, the official route designated by the Transportation Committee.

Wonderful country, the Great Northwest. Rich in Scenery, endless in pleasure-opportunities, a land of romance and greatness in the making.

A double opportunity. The wonderful Yellowstone Park en route at small additional cost; the Lewis and Clark Exposition at the journey's end.

Three Solid Special Trains For Convention Delegates

- "Medical Journal Special" leaving Chicago June 30, St. Paul July 1. Stops en route for a comprehensive tour of Yellowstone Park, "America's Wonderland." An interval of rare pleasures.
- "Second Medical Journal Special" leaving Chicago July 1, St. Paul July 2, stopping en route for a tour of Yellowstone Park.
- "Medical Society Special" leaving Chicago July 6, St. Paul July 7, with sight-seeing stops at important cities en route to Portland.

Travel Comfortably.

Northern Pacific Railway

"Every Mile an Education"

Ask for information which will enable you to travel on one of the special trains. "Wonderland 1905" for 6 cents, "Lewis and Clark Booklet" for 4 cents.—A. M. CLELAND, Gen'l Pass. Agt., St. Paul. Rates, dates, itineraries from

P. W. PUMMILL, D.P.A.,

711 Chestnut Street, Philadelphia.

Spaltcholz and Barker

Atlas of Human Anatomy

By WERNER SPALTEHOLZ,

Extraordinary Professor of Anatomy in the University and Custodian of the Anatomical Museum at Lengag

EDITED AND TRANSLATED FROM THE THIRD GERMAN EDITION BY LEWELLYS F BARKER, MB, Tor,

Professor of Anatomy University of Chicago

WITH A PREFACE

By FRANKLIN P MALL,

Professor of Anatomy in the Johns Hopkins University Baltimore

Square Octavo 872 pages. 935 Illustrations. mostly in colors. 3 volumes, Cloth. \$10.00 per set.

Vol 1 -Bones Joints, Ligaments

Vol 2—Regions, Muscles, Fasciæ, Heart, Blood vessels
Vol 4—Viscera, Brain, Nerves, Sense-organs

This work is intended to embrace the entire descriptive anatomy, with the extention of histology and is likewise intended to have due regard for the field which lies between nuicroscopic and macroscopic anatomy proper

The text gives a clear description of the figure, and it is much more detailed than is really necessary in an Atlas in which the illustrations are the essential, yet it resembles many text books in completeness. For showing the soft parts, the material was all carefully hardened in formalin

Notwithstanding the enormous cost of production, the price has been kept down to a figure that places this sumphous work within the reach of every practitioner and student. The majority of the illustrations are from original drawings by the well-known anatomical struk. Bruno Héroux.

The book speaks for itself, must be seen to be appreciated, and, when once seen, will be universally hailed as one of the finest Anatomical Atlases ever placed upon the market.

J. B. Lippincott Company

London since 1872

Philadelphia since 1792

JUST ISSUED

The International Clinics

give bedside instruction by the leading medical men of the world. One volume (300 octavo pages) every three months, containing 25 practical articles, short and crisp, giving the latest view as to diagnosis, therapeutics, and treatment, beautifully illustrated, thoroughly indexed, covering every department of medicine and surgery. Positively the most practical and economical work you can buy. Investigate.

Cloth, \$2.00 per volume. Half Leather, \$2.25 per volume. Payable, \$2.00 every three months.

PARTIAL CONTENTS OF VOLUME II Seventeenth Series

TREATMENT

Vaccine Treatment of Infectious Diseases, by Rufus I. Cole, M.D. The Treatment of Rheumatism, by Bertram Abrahams, M.D. The Thermal Treatment of Aix-les-Bains, by Jean Dardel, M.D. Management of Exhaustion States in Men, by J. Madison Taylor, M.D.

SURGERY

Perforated Duodenal Ulcer, by H. S. Clogg, M.D. Surgical Syphilis, by Charles Green Cumston, M.D.

General Anesthesia Unjustifiable in the Radical Cure of Inguinal Hernia; Local Anesthesia in Major Operations, by John A. Bodine, M.D.

Asepsis and Antisepsis, by J. W. Wainwright, M.D.

In addition to the above, other subjects, under the heads of Medicine, Gynecology, Pediatrics, Nervous Diseases, and Pathology, are treated in a practical and thoroughly up-to-date manner.

NOW READY—OUR LATEST CATALOGUE OF

MEDICAL AND SURGICAL PUBLICATIONS
SENT ON REQUEST

J. B. LIPPINCOTT COMPANY

LONDON since 1872

PHILADELPHIA since 1792

IN THE TREATMENT OF

ANÆMIA, NEURASTHENIA, BRONCHITIS, INFLUENZA, PULMONARY TUBERCU-LOSIS, AND WASTING DISEASES OF CHILDHOOD, AND DURING CONVALESCENCE FROM EXHAUSTING DISEASES.

THE PHYSICIAN OF MANY YEARS' EXPERIENCE

KNOWS THAT, TO OBTAIN IMMEDIATE RESOLTS, THERE IS NO REMEDY THAT POSSESSES THE POWER TO ALTER DISORDERED FUNCTIONS, LIKE

"Follows Syrup of Hypophosphites"

MANY A TEXT-BOOK ON RESPIRATORY DISEASES SPECIFICALLY MENTIONS THIS PREPARATION AS BEING OF STERLING WORTH.

TRY IT, AND PROVE THESE FACTS.

NOTICE.—CAUTION.

offer imitations of it for sale Mr. Fellows, who has examined samples of several of these imitations of it for sale Mr. Fellows, who has examined samples of several of these imitations, finds that no two of them are identical, and that all of them differ from the original in composition, in freedom from aeld resettion, in susceptibility to the effects of oxygen when exposed to light or heat, in the property of retaining the strychain in solution, and in the medicinal effects.

As these cheap and inemcient substitutes are frequently dispensed instead of the original, physicians are carnestly requested, when prescribing the Syrup, to write "Syr Hypophos, FELLOWS."

MEDICAL LETTERS MAY BE ADDRESSED TO

MR. FELLOWS, 26 CHRISTOPHER STREET, NEW YORK.

ANASARCIN

RELIEVES

Valvular Heart Trouble

by reducing number of heart beats, giving the heart rest, increasing the force of the Systole, eausing valves to close more thoroughly, thus preventing regurgitation, relieving the dyspnea and increasing heart nutrition.

Cirrhosis of the Liver

by equalizing the eirculation, dilating the arterioles, thus relieving obstruction in the branches of the hepatic artery and portal radicles, securing better circulation in the liver and more nutrition to the cells and interlobular connective tissue.

Ascites and Anasarca

by causing resorption of the effused serum into the eirenlation, whence it is easily eliminated with salines.

Exophthalmic Goitre

by its inhibitory power over the eardiae fibres of the pneumogastrie, controlling the heart's action indefinitely without detriment, thus preventing enlargement, or restoring to normal if already enlarged, the thyroid arteries and the vessels behind the globes which cause prominence of the cyeballs and enlargement of the thyroid gland, both of which are consecutive to the eardiae disorder.

Bright's Disease

by its power to relieve distal engorgements through its wonderful equalizing effect on the circulation, dilating the arterioles and establishing a normal physiological balance between arterial and venous systems.

Sample and Literature to Physicians

Address

THE ANASARCIN CHEMICAL CO.

WINCHESTER, TENN., U.S. A.

Messrs. THOS. CHRISTY & CO., London Agents

Artificial Limbs

WITH RUBBER HANDS AND FEET.

also measurement sheet

A. A. MARKS, 701 Broadway, New York City



----ANTIKAMNIA @ SALOL TABLETS-

Hare toys. Salol renders the intestinal canal unitesption and the most valued drug in intestinal allections. The anostrue properties of Artikannia in connection with Saloi render this tablet very useful in Dysenfert indivestion. Chalera Mortus Diarrhox, Colic, and all conditions due to intestinal fermentation.

LAXATIVE ANTIKAMNIA @ QUININE TABLETS

To reduce letter quiet sain and as the same time administer a smile honolexculre is to accomtish a great cast with a singletablet. Among the may discases and effections which call for such a combination we must mention La Grippe, Influence, Coryea, Cought and Colds, Chills and Ferer, Billiousness, Dergue and Malaria with its greater discomfore and great devile.

ANTIKAMNIA & CODEINE TABLETS

Especially useful in Drumenorthou, Ustro-Orarian Pain, and pain in general caused by suppressed or irregular menses. This tablet controls the pains of these disorders in the shortest time and by the most hasterial and economic nethod. The spreedge action of these drugs is also, if or not only on a fair secture and analysis properties assurpessed, but they are followed by no unpleasant effects. The effects of their state in natives of the fair is well known.

THE ANTIKAMNIA CHEMICAL COMPANY

ST. LOUIS, U. S. A.

When writing, please mention Annals or Surgery,



NORTHWEST MEDICINE

An Ethical Monthly Medical Journal owned and controlled by the Medical Profession of the Northwest,

It publishes selected Original articles, Reports of the Local Societies, Editorials, Abstracts and Book Reviews.

Its object is to gather and record the Medical Literature of the Northwest and to promote the welfare of the Medical Profession.

Subscription \$2.50 per annum.

Splendid medium for advertisers. Rates on application. Send for sample copies. Address

NORTHWEST MEDICINE

MARION BUILDING

SEATTLE, WASHINGTON

When writing, please mention Annals of Surgery.

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic.

Antiseptic and Styptic. The application of Orthoform to wounds of whatever character relieves pain for hours, frequently days. Also itching and pain of Pruritis, Eczema, Laryngeal Tuberculosis. Otitis. Conjunctivitis, etc.

Used as sprinkling Powder, Insufflation, Emulsion or Orintment.

Literature on application to

VICTOR KOECHL @ CO.

NEW YORK

D.Deimel Underwear (LINEN-MESH)

To people who have been wearing overheating, perspiration-inducing wool, it is like a pleasant change of climate to put on a suit of this cool, comfortable linen underwear. A trial will convince you.

> All Dr Deimel Garments bear the Dr Deimel name For Sale at Best Dealers Everywhere If your Dealer cannot supply you, write to

THE DEIMEL LINEN-MESH CO. 491 BROADWAY, NEW YORK

\$45 FALECTSOS WISETSGTOS BLOCKET PARTHORE NOTERALL LOSSOS 111 Nortgonery St. 1313 F St. I. W \$10 Falton St. 111 W Termpore St. 2202 St. Culturas St. 23 Strand (Model Carl).

Dr. Deinel Linen-Mesh Supporters, Suspensories, etc., are made and sold exclusively by J. ELL, VOOD LEE CO., Combobocken, Pa.



DR. BROUGHTON'S Sanitarium

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to

R. BROUGHTON, M.D. ROCKFORD, ILL.

TILK'S MEDICAL REGISTER

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

See that the name R. L. POLK & CO.
IS ON THE ORDER BEFORE YOU
SIGN IT.

POLK'S is the only complete Medical Directory.
POLK'S is the only Medical Directory having an index to all physicians in the United States.

POLK'S has stood the crucial test of time with increasing popularity. It thoroughly covers the field.

R. I. POLK & CO., Publishers,

Subscribe now.

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in confort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

COLLARGOLUM

UNGUENTUM CREDÉ

(155 Lollargolum O menest) tious processes. Clinical experience coorded in a literature of over 150 reports shows their efficacy and harmlessness

CREOSOTAL-HEYDEN DUOTAL-HEYDEN

Bland carbonates of the caustic creosote and guaiacol. Even 132-dram doses are well borne Hundreds of

check beginning sepses and are powerful weapons even in desperate infec-

publications evidence their value in phthisis, pneumonia, typhoid fever, bronchitis, etc.

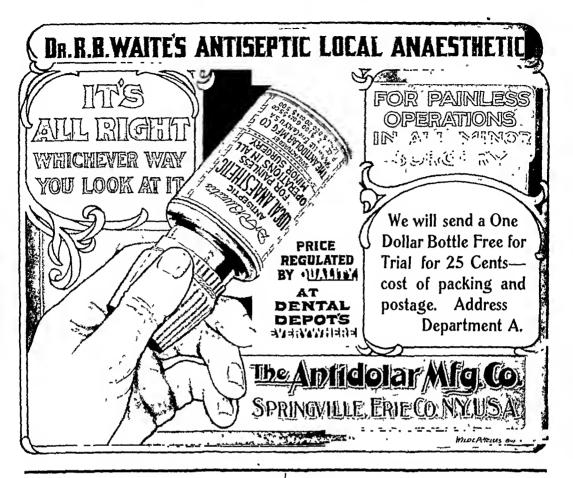
ORPHOL

(Betanaphtol Bismuth—Heyden)

The astringent antiseptic par excellence in all enteric fermentative processes. Innocuous, inodorous, tasteless.

It rapidly eliminates the toxalbumins and soothes inflamed mucous membranes.





PEPTO-MANGAN.

In respect to the curative properties of Gude's Pepto-Mangan, I have been particularly satisfied in the treatment of anæmia and chlorosis. In only one instance was there a complaint concerning some slight difficulty in digestion. Especially good results were obtained in a demented patient who took but very little nourishment, and it is my opinion that this patient is indebted to Pepto-Mangan, which she has taken for the last six months, for being still able to walk. Thanking you for your kind efforts, I remain, DR. KNITEL.

Ebelsberg, Austria, August 8, 1901.

Your preparation is often prescribed by me and has always met my expectations. It is particularly useful in greatly exhausted and very anæmic children, as well as in cases of measels, whooping cough, and anæmia, since it is easily digested, increases the appetite, and hastens convalescence, as manifested by a rapid increase of bodily weight.

DR. E. LEWY.

Vienna, September 6, 1901.

It affords me much pleasure to report to you the very satisfactory effects of your Pepto-Mangan (Gude). I employed it in two cases of obstinate chlorosis of several months' duration, and in the case of two children, one of which was convalescent after a severe attack of influenza, while the other was in a condition of general weakness of rachitic origin. In all these cases, especially in the first-named (chlorosis and convalescence), the preparation exerted an excellent tonic influence, while in every instance its action in stimulating the appetite and digestion was distinctly evident. In the first case a rapid recovery ensued with a prompt and regular return of the menses, which had been absent for many months.

I am very glad to inform you of these satisfactory results, and I shall in the future continue the use of this preparation, which is so worthy of recommendation as an agreeable chalybeate, and which promotes an increase of strength and assimilation.

Dr. KOENIG.

Wiesbaden, August 10, 1901.



When writing, please mention Avvais or Surgery

8

BLOOD

DEGENERACY

may become brain degeneracy. Build up the condition of the blood and you build up the condition of the fundamental force of the body. Blood degeneracy, like moral degeneracy, denotes a lack of power to resist. A weakened condition of the blood leaves the system an easy prey to malarial affections and contagious diseases.

* * *

. . .

y**.** y**.** y

x x

• - -

.

y. *y*.

% %, %

Pepto-Mangan ("Gude")

y. *y*.

* * *

y y

ઝ ઝ ઝ

*y*e *y*e

y y

× ×

ابن تدن تدن

. St. . St.

SAMPLES
AND
LITERATURE
UPON
APPLICATION

is the vital force which restores the blood to its normal germicidal potency. It is a nutrient oxygen carrying agent. After typhoid fever and all diseases producing cachexia, when Pepto-Mangan ("Gude") is administered, systemic reconstruction is rapid.

PEPTO-MANGAN ("GUDE") is ready for quick absorption and rapid infusion into the circulating fluid and is consequently of marked and certain value in all forms of

Anæmia, Chlorosis, Bright's Disease, Rachitis, Neurasthenia, etc.

To assure proper filling of prescriptions, order Pepto-Mangan ("Gude") in original bottles containing 5 xi. It's Never sold in bulk.

M. J. BREITENBACH COMPANY,

LABORATORY, Leipzig, Germany. 53 WARREN STREET, NEW YORK.

Kutnow's IMPROVED POWder

"The Practitioner," England says :-

MARCH, 1904

"This preparation possesses a pleasant taste
It is a very pleasant form of lavatuse medicine, acting,
if taken in hot water before breakfast, on an empty
stomach, in the space of about one hour Kutnow's
Powder will be found most useful by sufferers from
homorrhoids, as it is gentle in its effects, while relieving
the loaded portal system by its hydrogogue action"

Especially valuable for Surgeons after operations, to overcome the nausea after the anesthesia and to coax the peristaltic action.



LAWSON TAIT

Removes Constipation, Indigestion, Biliousness and is most useful in all derangements of the Stomach, Liver, and Kidneys.

SAMPLES SENT FREE TO PHYSICIANS

APPLICATION FORM

A FREE TRIAL

OF KUTNOW'S POWDER

To any Member of the Medical Profession

NAME

Annals of Surgery

Kutnow Bros., Ltd.,

853 Broadway, New York, U. S. A. 41 Farringdon Road, London, Eng.

BOOK NEWS

There are people and people who, each month, anxiously await the coming of "Book News."

It puts them so thoroughly in touch with the literary world.

There are book-buyers, many of them, who would not think of making a purchase without first consulting "Book News."

Its reviews are always complete and up-to-date and every new book is noticed.

There are dozens of persons who are using "Book News" as a guide to literary taste and are, with its aid, taking a long step toward literary culture.

"Book News" has an Educational Course that is unique and practicable; no other magazine has any department like it.

SPECIAL FEATURES OF AUGUST "BOOK NEWS"

ONE MONTH WITH THE MAGAZINES. By Cyrus Townsend Brady, author of "A Little Traitor to the South," etc.

Mr. Brady analyzes the contents of the various larger American magazines through one month's issue. The study is full of point, and has Mr. Brady's customary quality of breeziness.

VISITING CARDS. By John Thomson, Librarian of the Philadelphia Free Libraries.

Mr. Thomson gathers together a surprising number of intensely interesting facts concerning the history and use of visiting cards.

THE SHEPHERD'S HOUR GLASS. By John Russell Hayes, author of "Swarthmore Idylls," etc.

This is the first of two papers in which Dr. Hayes studies nature and nature's poets, incorporating into the articles some of his own very excellent verse.

SPECIAL SUBSCRIPTION OFFER.

New subscriptions beginning with July will be enrolled as beginning with September, and the July and August issues will be sent free of charge.

(SEE BLANK BELOW.)

BOOK NEWS, 50 Cents a Year.

John Wanamaker, Publisher,

Philadelphia, New York, Paris

SUBSCRIPTION BLANK

Enclosed find 50 cents, for which kindly enter my name as subscriber to BOOK NEWS for One Year, beginning with the September issue, and send, as per your offer, the July and August number free of charge.

Name	
Address	

FOR ENTERO-COLITIS

FOR ERYSIPELAS

FOR FELONS

FOR INFLAMED GLANDS

FOR PLEURISY

FOR PNEUMONIA

FOR POISON IVY

FOR POISON OAK

FOR RHEUMATISM

FOR SYNOVITIS

FOR SPRAINS

FOR SPASMODIC CROUP

AND

FOR ANY INFLAMMATORY DISEASE

REQUIRING LOCAL TREATMENT

USE

ANTIPHLOGISTINE

LIBERALLY

THE RESULTS WILL ALWAYS BE SATISFACTORY.

To insure economy and the best results always order a full package and specify the size required—Small, Medium, Large or Hospital Size

THE DENVER CHEMICAL MFG. Co. NEW YORK,

DEFENSE

OF MALPRACTICE

SUITS IS GOOD

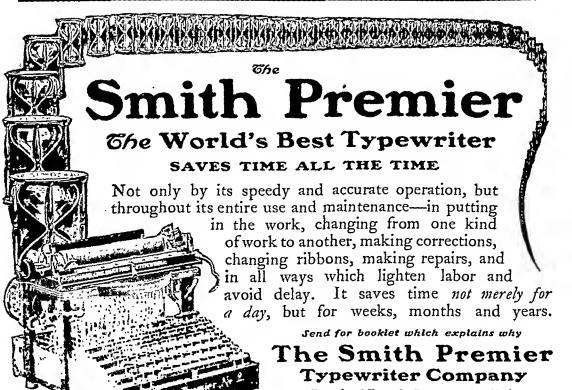
But the Busy Doctor also wants

PROTECTION

The Fidelity and Casualty Company of New York

Defends its clients against any such Proceedings at its Own Cost, and if Damages are awarded will PAY them.

Special Accident and Health Insurance for Physicians, Surgeons, Dentists, etc. EVERYWHERE



Executive Office, 287 Broadway, New York Factory, Syracuse, N. Y.

Branches in all large cities



The Winkley Artificial Limb Co.

(Incorporated under the Laws of the State of Minnesota.)

JEPSON BROS., Sole Owners.

LARGEST MANUFACTORY OF ARTIFICIAL LEGS IN THE WORLD.

MANUFACTURERS OF THE

LATEST IMPROVED, PATENT ADJUST-ABLE, DOUBLE SLIP SOCKET

Artificial Leg

(Warranted NOT to Chafe the Stump.)

With SPONGE RUBBER, Mexican Felt or English Willow FOOT.

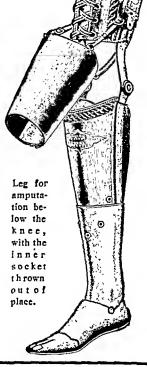
PERFECT FIT GUARANTEED

From Casts and Measurements WITHOUT Leaving Home

Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN.

U. S. A.



Doctor | Need a Tonic.

The next time a patient says this to you, write a prescription for Colden's Liquid Beef Tonic. The patient may be right. He may be mentally and physically in a state of morbid depression. Everything may "go wrong" with him. A tissue-forming, stimulating restorative may be exactly the indication.

Order Colden's Liquid Beef Tonic in addition to your specific medication. There can be no mistake if you specify "Ext. carnis fl. Comp. (Colden)."

Literature mailed to physicians on request.

THE CHARLES N. CRITTENTON CO.

115-117 FULTON STREET, NEW YORK.

${ m A}$ nnals of ${ m S}$ urgery

Vot. XI.

IUI Y. 1904

No 1

ORIGINAL MEMOIRS.

THE ANATOMY AND SURGERY OF THE INTERNAL DERANGEMENTS OF THE KNEE-JOINT.

BASED ON A STUDY OF 150 DISSECTED JOINTS AND THE LITERATURE.

BY BENJAMIN TENNEY, MD.

OF BOSTON,

Formerly Instructor in Anatomy Harvard Med cat School and Surgeon to Out Patients
Boston City Hospital Ass stant Surgeon Boston Dispensary

ANATOMY

FITE knee is a joint depending entirely upon ligaments for its strength. Disregarding the patella, there are only two small articular areas in contact in all positions of the limb. These areas are convex on the femoral side, and slightly concave, plain, or even convex on the tibial side. There is neither cup nor socket nor real concavity of any sort, though there is a short and shallow mortise-and tenon effect produced by the projection of the tibril spines into the pophical notch. The two bones with the articular cartifuge left on and all the ligal ments removed are in unstable equilibrium in all positions. This mechanical disadvantage and the arrangement of the lubricating apparatus which is at times inadequate, and at times an actual obstacle to the working of the joint, furnish the chief reasons why the knee is the most frequently deranged of all the joints in the human body.

The fresh articular surfaces differ somewhat in shape from the ends of the dried bones. The articular cartilage of the femur is thickest over the trochlear surface on which the patella slides. It is also thickened along the curve of the condyles over the area which has contact with the tibia, and from this thicker strip it thins out gradually towards the margins of the bone. This makes the trochlear groove appear shallower and the condylar surfaces rounder on the fresh than on dry specimens.

The articular surface of the external tibial tuberosity is distinctly convex from before backward, and shows but little concavity from the tip of its spine to its margins. The articular surface of the internal tuberosity is slightly concave in all diameters, but by no means corresponding to the convexity of the femoral condyle. Moreover its surface is not in a horizontal plane, but slopes decidedly from before backward, giving the internal femoral condyle a constant tendency to slip backward. The articular cartilage on the upper surface of the tibia is thickest for contact with the femur, and regularly thins out from this area in all directions. Except on the surfaces which face the interspinous space, both tibial spines are covered with articular cartilage clear to their tips. Braune and Fischer have demonstrated that the shape of these surfaces changes somewhat under pressure.

Of the ligaments which hold these two joint surfaces in contact in almost all positions of the limb, some things of interest have been noted beyond the usual text-book statements.

The anterior crucial has a smaller cross-section at its middle than at either end and appears to be weaker than the posterior crucial. In twenty-three joints out of forty noted it was joined towards its upper end by a very slender bundle of fibres from the anterior end of the external semilunar,* and in six joints a small slip from the anterior crucial split off to join and be inserted with the posterior crucial.

^{*} This differs from the experience of Testut and Mouret.



Bones of right knee in extension front siew. Ligaments all removed. Position adjusted by comparisons with a partially disserted joint.

PLATE II



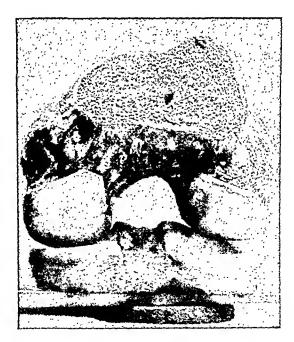
Lones of right knee in extension, back view

PLATE III.



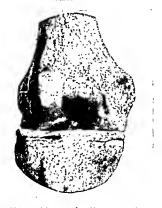
Bones of right knee flexed to 90°, front view.

PLATE IV.



Bones of right knee flexed to 90°, back view.

PLATE V.



Right knee joint extended, front new Lateral figurents removed, crucials and semilonars showing.



The posterior crucial at its insertion on the femur is joined almost always—thirty six times in forty—by a good sized band from the external semilunar, which is more tense in extension than in flexion

Between the two crucial ligaments where they cross and are continually rubbing a bursa may be found which does not usually communicate with the general synovial cavity

These ligaments are adjusted to limit extension, to control the movements of the femur and tibia in the anteroposterior plane to carry some of the weight when the leg is swinging clear of the ground and possibly to assist in producing close contact of the joint surfaces in internal rotation

The semilunar fibrocartilages may be considered as the semicircular remains of complete inter articular fibrocartilage discs with the centres worn through leaving sharp free edges directed towards the tibial spines and a thick periphery still attached to the inside of the capsule

Three specimens of the 150 joints examined showed external semilurars complete, except for a small opening against the tibial spine. The internal varies in width, but so far as known has never been found as a reasonably complete disc. Both are firmly blended at their peripheries with the capsule, fibres passing into them from above and from below. Both lose their layer of cartilage at their extremities, become fibrous bands and blend with the tibial periosteum or become continuous with some ligament.

The external semilunar in front is mainly attached to the normal articular surface of the external tibial spine. Its peripheral attachment to the capsule is interrupted by the opening for the popliteus tendon. This opening is usually slightly wider above than below, measuring fifteen millimetres above and twelve millimetres below as an average in forty joints. It is always obliquely directed the lower opening being internal.

Posteriorly the external semilunar sends its main attachment to the middle part of the interspinous space, and also sends a strong band to be attached parallel to the posterior crucial on the femur These bands were noted as follows

Inserted anterior to posterior crucial	II
Inserted posterior to posterior crucial	5
Split, one strand in front, the other behind	20
Absent	4
-	
	40

Sometimes these bands blended with one or the other crucial, and sometimes they remained distinct to their point of insertion.

The internal semilunar has no break in its peripheral attachment, but on the contrary is firmly attached to the internal lateral ligament which holds it very closely to the tibia. Posteriorly it sends a fibrous end in between the posterior crucial and the tibia, to be attached to the non-articular surface of the internal tibial spine, and in front it blends with the origin of the anterior crucial ligament in front of the internal spine.

In structure the semilunar fibrocartilages are composed of fibrous tissue, with fibres arranged parallel to the periphery, covered above and below with a layer of cartilage. The thickness of the structure at its periphery as compared with its free margin is due to a greater proportion of fibrous tissue rather than to any thickening of the cartilage layer, which is indeed thinner here than at the free border. On cross-section some vertical fibres of the capsule can be seen to pass into and blend with the horizontal fibrous core of the semilunar both from above and from below. The greater strength of the lower fibres, which are in no other way to be distinguished from the capsule, probably accounts for the separate name of "coronary ligaments."

The transverse ligament is a continuation of the semilunars and usually connects the two in front. It is not a constant affair of appreciable size. Its absence was noted in sixteen joints, and in eight it is recorded as threadlike out of seventy-three recorded. It may be a continuation of either semilunar. Five times it was continuous with the internal only and twice with the external. When this arrangement exists, its free end spreads out into the mass of fatty tissue below the patella This practically agrees with Higgins's observations,² and makes it difficult to agree with Pauzat's³ conclusions as to its great importance

At the inner side of the joint, the internal lateral ligament is firmly attached to the semilunar as before described, and at this point neither has motion independent of the other. On the outer side, the band of fibres called the anterior or long external lateral ligament bas no connection with the outer semilunar, and frequently its synovial bursa is interposed. Internal and behind this, the posterior or short external lateral ligament, which is a part of the capsule, is separated from the semilunar by the opening through which the popliticus tendon passes.

Both semilunars have some freedom of movement independent of femur and thia, though they only move with the joint capsule. The simplest description of their movements is to say that in flexion they move with the tibia, and in rotation with the femur. In full extension, they approach each other in their centres, and in flexion to a right angle or more their centres are somewhat separated. This is as might be expected from the divergence of the femoral condyles.

The external has much greater freedom of movement than the internal, lacking the restraint of anything like the short and powerful internal lateral ligament. Pauzat and others assert that their excursions in the joint are governed by muscular attachments, but the writer believes that their movement is entirely passive. They certainly move freely in a normal cadaveric knee.

The tibial surface exposed by the semilunars, when carrying no weight, is always larger than the surface of femur in contact in any normal position of the joint. When the knee is put under pressure in a vise, the external semilunar can be made to fit the external condyle soughly in extension, but in no other position. The internal cannot be made snug. In other words, the semilunars are not so well placed to carry the weight of the body, whether standing or with bent knees, as they are to assist the lateral ligaments of the opposite side,

and to limit the excursion of the condyles from the tibial spines.

For example, if the internal semilunar be removed with as little damage as possible to the capsule, the joint works well in flexion, rotation, and extension, until some force acts to bend the knee outward. Then it is evident that the external lateral ligaments are insufficient to prevent an increase over the normal motion in this direction. The same is true of forces acting to bend the knee inward after removal of the external semilunar. With the removal of both, this fact becomes still more evident, and the lateral motion of the knee is increased from about five degrees to fifteen degrees or more.

With both semilunars present, these lateral movements are resisted not only by the opposite lateral ligaments, but by the horizontal fibres of the semilunars, and the increased tension of the crucials as the femur and tibia are separated by the wedge of fibrocartilage. With a semilunar absent the corresponding femoral condyle is free to slip down away from the tibial spines, with nothing to stop it save a flexible guy on the other side of the joint.

In full extension there is probably little weight carried on the semilunars unless there be side pressure. With any lateral strain on the joint, the semilunar on the side against which the force is exerted becomes immensely important in preserving the stability of the joint. In flexion the internal condyle rolls back on to the internal semilunar if the leg be rotated out, and this comparatively fixed part of the cartilage probably sustains some weight under these conditions, though most of the pressure comes through the external condyle in this position.

A small but constant artery runs around the periphery of each cartilage where the capsular fibres blend with it.

The joint cavity is enclosed by a synovial membrane, external to which is a covering of fibrous tissue thickened in certain locations and added to in others by the endings of active or outgrown muscles.

Of the ligaments which may be considered thickenings

PLATE VIII



Same as Plate VII back v ew



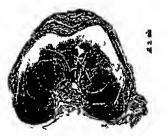
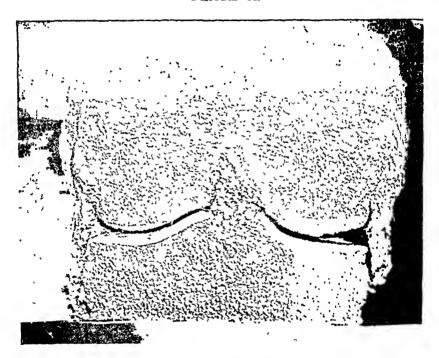


PLATE X.



Vertical transverse section through lateral ligaments left knee, joint extended.

Front view of section.

of the capsule, the internal lateral is the strongest and shortest, and is said to be the vestige of a long adductor magnus tendon to the tibia

On superficial dissection it appears fan shaped, with fibres radiating from the prominence on the internal femoral condyle. In horizontal sections the bulk of the fibres can be seen to pass almost directly downward to be attached to the floor and margins of the groove for the semi membranosus on the tibia while only the most superficial fibres have the radiating arrangement—an anterior set passing down under and almost as far as the grachis tendon, while the posterior fibres swing around even behind the internal condyle into the posterior part of the capsule.

Its length as measured on the outside of a dissected joint is much greater than that of its shortest fibres which are in contact with the synovial membrane and the semilunar car tilage

Its working length is, of course, no greater than that of these shortest fibres which do not measure over three and onehalf or four centimetres,—twelve joints measured

The function of this ligament is to guard against strains tending to bend the knee inward to prevent over extension of the joint, to limit rotation of the leg and foot and to assist in carrying the leg weight when the foot is off the ground It also greatly limits the movements of the internal semilunar fibrocartilage

The external portion of the capsule is supported by the long external lateral ligament, the populteus and the biceps tendon, and consequently shows less thickening than the internal part

The long external lateral ligament shows plainly its connection with the upper end of the peroneus longus, and is said to be a vestignal attachment of that muscle. It is long and slender, and always has something of a synovial bursa about it, sometimes entirely surrounding it, so that the ligament is not attached to the capsule

The biceps tendon is not only inserted into the fibula and

tibia, but its tendon blends with the posterior and outer part of the capsule from the origin of the outer head of the gastrocnemius down. It can be separated from this part of the capsule only by a forced dissection, and cannot fail to take some of the side strain of the joint in extension.

Under these two lies the capsular thickening called the short external lateral ligament, which is less sharply defined than the internal lateral. These fibres also radiate from a prominence on the external condyle, and pass down to the tibia and fibula; but the shortest fibres are on the average one centimetre longer than on the inner side of the joint, thereby allowing more movement of one bone on the other than can take place at the inner side.

The function of the external lateral ligament and its assisting structures is to resist strains tending to bend the knee outward, and in other respects to act with the internal lateral in limiting external rotation of the leg, and carrying a share of the weight when the foot is lifted from the ground.

The posterior part of the capsule consists of two hoods which cover the two femoral condyles between the lateral ligaments and the crucials. At the popliteal notch they blend with the posterior crucial ligament. On the tibia they are attached just below the margins of the articular surface, except as the external continues on the posterior surface of the popliteus with the expansion of the semimembranosus, and on the femur they are attached very near the edges of the articular cartilage.

Superficial to this, but under the gastrocnemius, lie some oblique fibres of irregular arrangement and size which are grouped as the "posterior ligament of Winslow." In a general way they run as slender fibrous bands from the place where the semimembranosus tendon reaches the capsule to the upper and outer side of the popliteal notch. One or two strong bands usually arise from the semimembranosus tendon itself, but most of these strands have no connection with it, and seem better adapted for furnishing an elastic bed for the popliteal artery and preventing its kinking in flexion than for strengthening the articulation. The experiments of Poirier 1 point

to the same conclusion. In two joints out of sixteen, some of the strands were so directed that they could possibly draw both semilunars backward as the semimembranosus contracted, but other dissections indicated that this was an exceptional arrangement

In full extension the attachments of these posterior hoods to the tibia and femur are separated about five centimetres, while in flexion the distance is reduced to a single centimetre. This slack of the capsule in flexion is taken up by the two heads of the gastrochemius which not only cover the two hoods behind but take origin from them for a distance of about two centimetres.

The patella has a thick layer of cartilage on its posterior surface even thicker than the layer to be found on the trochlear surface of the femur. This surface is convex in all diameters, most convex from side to side.

With complete contraction of the quadriceps the whole of the articular surface of the patella is raised above the articular surface of the femur. With knee extended and quadriceps relaxed the lower half or third of the patellar cartilage is in contact with that of the femur.

During flexion the patella slides down having more contact with the external than with the internal condyle. With the knee bent to a right angle or completely flexed its contact is very slight with the internal condyle being one centimetre or less in width. Even this contact can be lost, and the inner border of the patella may slip in between the condyles.

In a kneeling position with the joint bent to a right angle most of the weight of the body is carried on the patella. When the joint is completely flexed, the body weight is carried on the tubercle of the tibia

The burse in front of the patella and that beneath the patella tendon have always been found when sought, and the latter, though separated from the synovial cavity of the joint by a flin partition, has never been found to communicate with the joint

English and American text books of anatomy are curi-

ously silent as to the lateral ligaments of the patella, and the latest German book does not even mention them. One or both existed in each of twelve joints dissected carefully, and the internal was identified in fifteen other joints taken at random.

The internal is much the stronger, and is a flat, triangular band passing from the prominence on the internal femoral condyle to the upper half or two-thirds of the inner border of the patella. It is a distinct band at its origin, has many almost horizontal fibres of the vastus internus inserted into its anterior surface, and finally, covered by the muscle, mingles with the complex fibres of the quadriceps aponeurosis surrounding the patella.

The external is thinner, narrower, and weaker, and was not found in two joints out of twelve as a distinct structure, though even in these there were a few slender transverse fibres. When present it passes horizontally forward from the prominence on the external femoral condyle to the upper third of the external border of the patella. It is interlaced with fibres of the iliotibial band and with the extensor aponeurosis near the patella.

The function of these ligaments is to steady the patella as it slides on the femur, and prevent lateral slipping or dislocation, and, as the strain is greater on the internal than on the external, the internal is not only much stronger, but it is reinforced by the lower vastus internus fibres which are inserted on its anterior surface.

The ligamentum mucosum is a thin, vertical partition of synovial membrane between the two sides of the joint. It has a free upper border which extends from just below the patella to the anterior crucial ligament. In a total of fifty-eight cases where it was noted, it was apparently lacking in two, and in two other cases the ligament had evidently been torn. It was a mere thread in eight cases, a band with an opening below it in four cases, and in nine cases it was a complete ligament.

The mucosum may be a vestigial structure, but is of present use in holding the anterior synovial pad against the femur.

Cagottal section through external countyle and tibia left knee immer slide of section joint extended

Sagittal section through internit condyle and tibiz left knew, outer side of section fout extended

PLATE NII

PLATE XI

PLATE XIII



Right knee, internal lateral ligament

PLATE XIV



PLATE XV.



Internal patellar ligament and synovial pouch on front of extended joint, right knee. Joint cavity distended with wax. Upper and lower margins of patella marked by black lines,

There is some confusion in the literature as to the struct ures to which the name "alar ligaments" belongs An instance of this is found in Allingham's a monograph, where he quotes Lang's description of the alar heaments as "fringes of the ligamentum mucosum,' "in many cases hard and the figamentum mucosum, always found to be introduced between the femoral condyle and the anterior portion of the semilunar fibrocartilages in complete extension." This description evidently applies to the postero-inferior free margin of the infra natellar nad

When the joint is opened by a transverse cut above the patella and this bone is turned down, two tense folds of syno vial membrane can be seen passing forward from the ligamentum mucosum to the sides of the patella. These answer to the description of alar ligaments given by Morris and others, but do not appear on the interiors of joints hardened in formalin, from which the femurs have been subsequently re moved Their apparent continuation as two fibrous folds of the extensor aponeurosis on either side of the patella projecting backward into the joint can always be seen, though the external is much less prominent than the internal The writer believes with Pauzat 3 that the synovial folds appear only in certain positions which do not exist in life Pauzat has traced distinct bundles from the fibrous folds above described to the anterior ends of the semilunar fibrocartilages, and believes that they serve to pull the semilunars forward and up with the contraction of the quadriceps The writer has not traced such bundles, but has found these folds spreading out generally into the fibrous framework of the infrapatellar pad, and believes that their function is to pull this pad forward and up out of harm's way during extension

Within the joint there are several pads covered with synovial membrane, which are composed of fat, fibrous tissue in varying amounts, and blood vessels The largest of these pads is attached to the extensor tendon below the patella and is rather triangular on section The broad base is in contact with the femur, and the two free extremities of the base

project upward between the patella and femur, and backward between femur and tibia. The lateral boundaries of this pad are usually well defined, being opposite the margins of the femoral condyles. It is held in contact with the condyles by the tension of the ligamentum patellæ and the mucosum.

The pad shows a tendency to become lobulated, and the lobules to develop pedicles. These lobules are of two kinds,—one composed of fat covered with synovial membrane, soft, and often ending in fine fringes as if it had been caught and frayed between the adjacent bones, the other composed of tough, fibrous tissue, pediculated, and never frayed or fringed.

Besides this largest fatty and synovial pad, there is a smaller one loosely attached just above the articular surface on the front of the femur, which is in contact with the patellar articular surface in extension. This shows smaller lobules which are often fringed. Two other small pads are found posteriorly in the joint just above the attachment of the two semilunars to the posterior part of the capsule. In two cases fibrous strands from these were found over the external semilunar cartilage, but none were found over the internal. These are the only pads which are constant, but often small ones were found on the front and outer side of the anterior crucial ligament, and projecting from the synovial membrane on the sides just above the attachment of the semilunars to the capsule.

One function of these pads seems to be that of "wipers," which keep the synovial fluid spread evenly over the patellar cartilage and the condyles of the femur. They also increase the area of synovial membrane which secretes this fluid, and possibly this is their chief function.

The synovial cavity of the knee-joint is very extensive, the synovial surface being much greater than that of any other joint in the human body. The capacity of this joint is nevertheless not large, but varies according to the presence or absence of accessory cavities communicating with the joint.

In testing the capacity of the knee, a series of fourteen undissected joints was taken, all about the average size and adults From a graduated reservoir two metres above the subject, a column of water was used to produce a pressure approximately that in the human arteries The results varied

25	follows*			
		Right Cubic Centimetres	Left Cubic Centimetres	
1	Female	80	90	No bursæ
2	Male	200	180	Large bursæ about semimembra nosus and biceps tendons
3	Male	120	170	Small bursæ about semimembra nosus tendons
4	Female	90	80	No bursæ
5	Female	120	84	Rheumatoid Left anterior crucial ruptured, Free bodies Bursa around right external lateral liga ment communicates with biceps bursa and joint cavity
6	Male	100	90	No bursæ
7	Male	150	200	Large bursæ about biceps and

With extended joint, this fluid was almost all anterior to the lateral ligament and under the quadriceps expansion. With joint flexed the fluid was forced to the back of the joint. After all the fluid had entered an extended joint that would, some thirty centimetres more would flow in if the joint were slightly flexed, and after this some little force was required to hold the kine in extension again. The patella could always be made to "float" after the admission of thirty cubic centimetres of fluid. Lubbe, Proqué, Meisenbach, and O Conor report cases of hemarthross from which blood has been aspirated in amounts varving from 130 t 180 cubic centimetres.

In no case has a large cavity been found under the quadri ceps, the bursa extending upward less than seven centimetres, and communicating with the rest of the joint in every case which can be recalled. No notes were made on this Higgins 2 reports that 98 per cent of cases show such communication.

In extension there is a synovial cul-de-sac above and on either side of the patella where synovial membrane is in contact with synovial membrane. This disappears during flexion The anterior wall of the sac is intimately connected with the extensor aponeurosis, and the posterior wall lies loosely against the non-articular front of the lower end of the femur internal and external to the patella. It extends about five centimetres above the level of the upper border of the patella, and usually communicates freely with the bursa under the quadriceps expansion. Laterally, it slopes down to pass under the lateral ligaments of the joint.

Summary of Movements.—The fully extended joint is without lateral motion, anteroposterior motion, or rotation. All three movements are present to some degree after slight flexion and increase up to right-angled flexion, after which they diminish again.

Extension is limited first by the posterior crucial. After rupture or section of this ligament, extension is still further increased by rupture or section of the anterior crucial, and later after rupture of the internal lateral and external lateral ligaments.

The oblique or posterior ligament of Winslow resists this motion little, if any. Flexion is limited by contact of the soft parts.

External rotation is limited by the two lateral ligaments and increased after section or rupture of either.

Internal rotation is limited by the internal lateral and anterior crucial in combination, and increased after section or rupture of either.

A slight forward slipping of the tibia on the femur is possible in external rotation, but is stopped first by the anterior crucial, and later by the two lateral ligaments. A slight backward slipping of the tibia on the femur is also possible on external rotation, but is limited first by the posterior crucial and later by the two lateral ligaments. Adduction and abduction are also possible in external rotation to a degree which can be felt with the hand on the joint. Adduction is limited first by the external lateral ligament, and later by the posterior crucial. It is also increased on the cadaver after removal of the internal semilunar. Abduction is limited first by the in-

PLATE XVI.



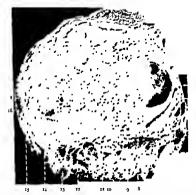
External patellar figurent and synoxial pouch Same joint as Plate XVI.

PLATE XVII



Right knee, specimen hardened in formalin Femur removed, showing two posterior hoods of the capsule.

PLATE XVIII

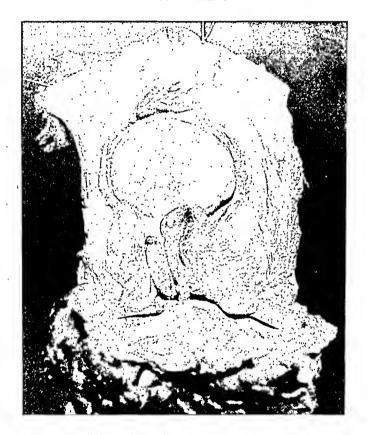


Horizontal section through right lines joint hardened in formalin. Section passes through middle of internal semilinar cartilage and just above middle of the external-

- r External semilunar
- 2 laternal semilunar
- 3 Slit between popliteus tendon and exter nal semilunar
- 4 and 5 External lateral figurents
- 6 Biceps tendon 7 External popliteal nerve
- 8 Plantaris

- a and to Gastrocuemius
- to. Internal popliteal nerve
- 11 Popliteal artery with veins between it and nerve
- 13 Tention of Semitentinosus
- 14 Tendon of Semimembranesus
- zs Teudon of sartorius
- 16 Internal lateral ligament

PLATE XIX.



Infrapatellar pad showing tabs, left knee.

ternal lateral, and later by the posterior crucial. On the cadaver abduction is greater after removal of the external

SURGERY

Among these 150 cadaveric joints were found examples of nearly every "internal derangement of the knee-joint" which has yet been described, as well as two which may be properly included under the same head, and which have not been described in print heretofore, so far as known

A classification of internal derangements according to their frequency in my series of joints would be

- I Tabs from the lubricating apparatus
- 2 Erosion of cartilage
 - 3 Damaged and displaced semilunar cartilages
 - 4 Ruptured ligaments
- Free and loose bodies
- 6 Villous or papillary synovitis, of which no instance appeared in these joints, and which will not be discussed Hoffa⁹ describes another condition as "atrophy of the quadriegs," which allows the capsule to catch between patella and femur or femur and thia. He describes it from the double stand point of surgeon and patient, and says that the condition usually dates back to some injury which requires rest in bed for a few days. It is curable by massage and gymnastics. My studies of cadaveric knees make me doubtful of the possibility of catching any portion of the normal synovial membrane excent the tabs from the lubricatine apparatus.

I TABS FROM THE LUBRICATING APPARATUS-PLATE XIX

The most frequently injured structure among my joints was the infrapatellar pad. Its condition was noted in 100 joints, and in every case there was some evidence of damage, unless the fine fringes on the edges of the soft fatty pads may be said to be normal constituents of the adult joint. These fringes were constant both for the part of the pad next to the femoropatellar contact and that nearest the femoroptic located. During flexion the edge of the pad nearest

the femoropatellar contact may be caught, and during extension the edge nearest the tibia. The suprapatellar pad often showed something of the same condition caused by its catching between the patella and femur during flexion, but here the apparent damage was less than below.

In either location a slight dryness of the joint will permit of a catch and pull, if not an additional crush of a tab.

No other joint in the body presents so favorable an arrangement for internal injuries, which, though slight and comparatively painless, may open both the lymphatic and general circulation into its cavity, and no other is so often attacked in the course of a general infection.

In one joint with marked loss of articular cartilage, where there was actual bony contact between patella and femur, with grooves and ridges worn in both, there were no fatty or fibrous tabs. Both pads were shrunken, and the fat was so largely absorbed, that the fibrous framework which is usually scarcely to be seen on the surface was more apparent than the fat.

Whether a loss of synovial secretion from an atrophied pad increased the friction between patella and femur and caused a wearing away of the articular cartilage is not known. The condition was interesting and unique in this series.

In twenty-two joints out of 100 noted there were seen tough fibrous tabs, pediculated and attached to the infrapatellar pad. These were situated as follows:

Internal to mucosum only in	18 joints.
External to mucosum only in	2 joints.
Both internal and external	2 joints.

These tabs were without fringes and were never found crushed, but in three joints were found injuries on the anterior part of the external semilunars which could be accounted for by a crushing force exerted through this tab in extension. These were the only semilunars seen with this injury.

There are but few references in the recent literature to operations for the removal of fatty and fibrous tabs as such. Some reported as growths from the synovial membrane above

the patella were possibly tabs from the suprapatellar pad Others described as fringes of the ligamenta alaria are evi-

Goldthwatt ¹⁰ removed tabs and fibrin masses from nineteen out of thirty eight knee joints opened Allingham ⁴ re moved them in two cases out of fifty nine joints opened, and Turner ¹¹ in three cases out of twenty nine

From my study of the cadaveric knees, it seems as if a much larger number of individuals must suffer from the conditions which appeared in connection with the supra and infra patellar pads than Allingham and Turner's figures indicate

Where these form a mechanical obstacle to the perfect working of the joint, they can only be removed by mechanical means. The only treatment is operation.

2 EROSION OF ARTICULAR CARTILAGE-PLATES XX XXI

A frequent injury found in these joints was seen on the articular cartilage at the back of the upper surface of the external tibial tuberosity. The damaged area usually measured a little over a centimetre in diameter, and was always rounded It was noted as follows.

Normal tibial surfaces	59
Softened tibial surfaces	19
Old fibrous surfaces	43
Not noted	29
	150

It showed all stages from a shallow cracking or "crazing" of the smooth cartilaginous surface to bare bone with a few tufts of fibrous tissue projecting from the edges and from small centres inside the bare space. Five joints in which the "lipping" of bone was well marked showed normal cartilaginous surfaces at this point. There was no constant relation between this condition and gross injury to the semi funar.

Dorsal decubitus with antemortem or postmortem mace ration might be suggested as a cause for this condition, but

one-third of all these joints showed tough fibrous tissue in place of the articular cartilage which would indicate antemortem change. Moreover, if it result from maceration, the damage should be as evident in the synovial pouch under the popliteus, which is lower than this tibial area in the dorsal position. This was not found to be the case. The appearance of these areas suggests mechanical damage rather than maceration.

If an individual is kneeling for any considerable time, the fluid contents of the joint must gravitate towards the patella, leaving the back part of the joint comparatively dry, and most individuals when working on their knees do so with internal rotation of the leg, which brings this part of the tibial surface in contact with the back of the external condyle of the femur.

The first movement, on rising to the standing position, is to draw one foot forward and plant it on the floor, putting this knee in nearly complete flexion. Then extension begins with the entire body weight resting on this knee. This gives us motion with a maximum of pressure and a minimum of lubrication as a possible cause for the damage seen.

If this condition exists as often among those whose work is done while kneeling as in this series, it perfectly accounts for the stiffness and difficulty with which they rise to their feet, and the absence of stiffness and pain when they are erect and walking about.

Another pathological condition was a loss of cartilage along the inner border of the patella. Where the cartilage appeared normal, there was often a fraying out of the edge of the internal alar ligament, or of the loose tissue lying partly covered by the alar and between it and the inner edge of the patella.

In right-angled flexion the main contact of the patella is with the external condyle, there being normally about one centimetre of its width in contact with the internal. With a lateral movement while kneeling, the inner edge of the patella might be forced into the popliteal notch, provided the internal

TAIR AL



Articular surface right tibia showing erosions at back part of external tuberosits

PLATE XXI



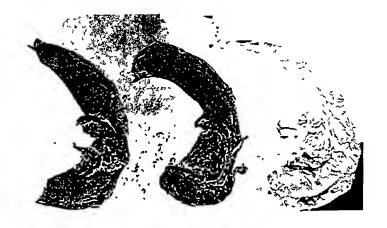
I eft patella abowing damage to articular cartilage at inner a argin

PLATE YXII



Three right internal semilanar cartilages showing fracture opposite internal lateral ligament upper surface

PLATE XXIII.



Same as Plate XXII, under surface

PLATE XXIV



Semilunars of right knee, showing effects of long-continued friction

19

patellar ligament is stretched or torn. The damage is done as the patella slips from beneath the outer edge of the internal condyle, and occasionally a less degree of injury was found there. Usually only the edge of the patellar cartilage was worn off, but at times an area one centimetre across was found with the cartilage layer worn through and strips or short tabs of fibrous tissue in its place. It is probably one of the least disabling of all the injuries found.

3 DAMAGED AND DISPLACED SEMILUNAR CARTILAGES-PLATES XXII XXIII, and XXIV

The most striking injuries in my 150 joints were found in connection with the semilunar fibrocartilages, and these were noted in all of the joints examined. They have been grouped as follows

Joints with both semilunars damaged

Joints with damaged external and normal internal semi-

Joints with damaged internal and normal external semilunars

Transverse fracture at attachment of internal lateral	
ligament	2
Transverse fracture with splitting or tearing from	
capsule	
Transverse fracture with wear on under surface only	5
Wear on under surface without complete fracture	4
Split or torn from capsule	2
_	
	14 = 42

Grouping all the damaged internal semilunars together there were:

Showing decided inju- Showing only fringes		
		20

The same grouping of the damaged external semilunars gives:

Of these forty-two joints, twenty-four were noted as showing some of the marks of inflammation or degeneration of articular cartilage, and doubtless more would have shown under a microscope the earlier changes which are associated with this condition. The important thing, so far as the semilunar cartilages are concerned, is the dryness and consequent friction which is almost always present in some stage of the condition.

The first noticeable effect of friction may be expected to show in the appearance of fine fringes or strands at the edges of the semilunars after the cartilage layer is worn away. Or, one or both of the semilunars may be caught between the moving femur and tibia and split longitudinally somewhere between their free edge and their capsular attachment as described by Barker 12 and others. If both remain attached to the capsule, they may be worn down to the fibrous core, which itself may be torn and irregular as shown in Plate XXIV.

These injuries may all take place as a result of friction while the ligaments retain their normal adjustment but long continued friction must ultimately result in ligamentous dam age through the strains produced by catching the semilunars and wedgrup the bones apart

In many of these joints it has been impossible to decide whether the dryness and friction preceded or followed the ligal mentious injury. Injuries to the knee which are classed as acute synovitis or sprain, and are not seriously disabling at the time, occur frequently among young patients who are less likely than the subjects from which these joints were taken to show degenerative changes. So it has seemed worth while to study the results of extreme movements on the ligaments, and the relation of ligamentous damage to the more obvious injuries seen on the semilinars.

Experimental work on the cadaver cannot reproduce the conditions during life, but some of the results are writh considering. First do the ligaments of the knee tear off their bony attachments or do they rupture in their continuity?

sidering First do the ligaments of the knee tear oft their bony attachments or do they rupture in their continuity?

The results obtained by Segond 18 Poiner, Bonnet, 14 Pagenstecher, 15 Hoenigschimed 19 Jersey, 17 and myself indicate that on the cadaver ligaments almost invariably tear from their bony attachments (usually from the femur), and usually with fragments of bone attached, Larsen 18 reports an operation for a loose osseous body in the knee attached to the femoral end of the anterior crucial ligament. Swan 19 and Fürbeck 20 both report similar operative cases. Pagenstecher reports three operative cases with rupture of the femoral attachment of the crucial ligaments and Battle 21 and Robson 22 one case each So far as cadaveric experiment and the reported operative cases go it seems most likely that the crucial ligaments at least and probably the laterals as well, are torn from their bony attachments more often than in their course.

Hints ²² is evidently of the contrary opinion, but presents neither experiment nor operative case to confirm his opinion, and quotes one description of Dittel's which directly states the existence of such an injury Second, What ligaments rupture?

Hints has gathered reports of thirty-four cases of rupture of the lateral ligaments of the knee with and without other ruptured ligaments. None of these cases were complicated by dislocation of the bones. Thirty-one of these were cases of rupture of the internal lateral and three of the external.

The experiments of Segond on the cadaver show that abduction alone or abduction combined with either rotation will rupture the internal lateral ligament by itself, also that adduction alone or combined with either rotation will rupture the external. With rotation alone, he always fractured the bones below the knee before any damage was done to the ligaments, and he quotes Bonnet as having had the same experience.

As to hyperextension, the results of his experiments agree with those of Poirier, who found the internal lateral remaining intact until after rupture of both crucials. Hoenigschmied was able to rupture the internal lateral ligament by external rotation, and the anterior crucial and internal lateral by internal rotation, without producing bony fracture.

Pagenstecher was able to tear the anterior crucial ligament from the femur by strongly flexing cadaveric knees over a round stick in the popliteal space, and also by combining complete flexion with adduction and internal rotation.

The cases of ruptured crucial ligaments in the living reported by him and by Battle and Robson will be referred to later.

Practically, all of these observers agree in giving the immediate results of these ligamentous ruptures as we should expect, and they may be tabulated roughly as follows:

Ruptured.
Internal lateral.
External lateral.
Anterior crucial.
Posterior crucial.

Increased Movement.

Abduction and both rotations,

Adduction and external rotation.

Internal rotation and forward slip of tibia on femur.

Internal rotation, extension, and backward slip of tibia on femur.

The effects of these increased movements on the semilunar cartilages do not seem to have been studied except as the semi lunars were damaged at the time of injury

So long as the normal knee is kept in a position of inter nal rotation the articular surfaces of femur and tibia are in such close contact that it is impossible to catch the semilunar fibrocartilages between the two articular surfaces With ex ternal rotation and a dry joint it is possible to catch the internal semilunar if the joint be moved slowly but it will not hold unless the internal lateral ligament gives way

In twenty four undissected joints one was found in which the internal semilunar caught and held under this manipu lation This joint had a noticeable increase of lateral move ment though no recent injury showed on dissection. In the other twenty three joints the internal semilunars caught after section of the internal lateral ligament at its femoral attach ment sufficient to allow an equal increase of lateral motion which means of course an increase in external rotation

If the femur be free to roll up on the posterior part of the internal semilunar it may simply hold it for a moment and then squeeze it back as one snaps an apple seed. This may not damage the cartilage for some time but when the ligaments have become stretched by repeated pulls or by some new and greater violence the condyle can roll entirely over the semilunar and settle down behind it

The joint is now locked in flexion, and must be unlocked by abduction combined with internal rotation and extension Apparently the most common result of this anterior disloca tion of the internal cartilage is that the posterior portion is pushed forward until stopped by its firm attachment to the internal lateral ligament and opposite this attachment a bend or transverse fracture of the semilunar occurs With repeti tion the cartilage layer underneath the semilunar is cracked off or worn through and fibrous tabs appear at the point of fracture which may project over the uncovered tibial surface

This has been the most common injury to the internal semilunars seen in these joints appearing in twelve of the fourteen where the internal only was damaged, and to a less degree in four of the fifteen joints in which both showed injury. Plates XXII and XXIII show three internal semi-lunars with this injury.

One joint shown on Plate XXV shows another possible result of over-riding. In this joint the internal semilunar has been torn from its capsular attachments all the way around and turned wrong side up into the intercondylar space, where it lies against the crucial ligaments with no tendency to return to its natural position. Croft,²⁴ Barker,¹² and Logan-Turner ²⁵ have found this condition in the living.

Several examples of another condition appear in the literature, though it is not the most frequent injury, as stated by Hoffa.⁹ The internal semilunar is torn from its anterior tibial attachment and the free end may or may not be turned up or folded back on itself. As a possible way in which it is produced, external rotation of the leg while the knee is flexed to a little less than a right angle and is bearing a heavy weight seems to me the most reasonable. At the same time, the internal lateral ligament must be partially torn from its tibial attachment to allow of any tension on the anterior attachment of the semilunar. No instance of this injury appears in my collection.

For the femur to over-ride the external semilunar cartilage greater looseness of ligaments is necessary, because, unlike the internal, the external semilunar has much freedom of movement and has the shape of a blunt wedge on cross-section. Considering a tear from the capsular attachment as evidence, there are three joints in which anterior dislocation of the external semilunar may have occurred.

4. RUPTURED LIGAMENTS.

"Sprains" and "acute traumatic synovitis of the knee due to strain" are scarcely to be found in recent literature outside the text-books. Ruptured ligaments, as such, appear but rarely, while dislocations are reported with some frequency, and the subject of "hæmarthrosis" of the knee-joint

PLATE XXV



Complete d slocation of internal sem lunar fibrocart lage right time. Both condules sawn through vertically and per pheral pieces turned out

PLATE XXVI.



Left knee, showing results of rupture of anterior crucial ligament, and fringing of the upper portion of the infrapatellar pad.

has quite an extensive literature Yet all of these are diagnostic names which cover varying degrees of ligamentous injury

Hints's ²³ collection of ruptured lateral ligaments has been referred to Pagenstecher ¹⁵ has recently reported three cases of suture of the crucial ligaments in which the joint was opened three months, four days and four months after the injury. In the first case, the posterior crucial ligament was found torn from the femur, and was sewn to the near by periosteum with good result.

The second case showed an anterior crucial torn from the femur, which was also sutured with good result

In the third case the anterior crucial was torn "near its insertion, atrophied," and was removed. Later, a free body was removed from this joint, and it became stiff as a result of some rheumatoid process. Robson 22 sutured both crucials to the femur eight months after injury with good result. Plate XXVI shows a joint with a complete rupture of the anterior crucial ligament.

Anterior dislocation of the external semilunar will not be so likely to result in damage to the cartilage itself as the same dislocation of the internal, because there is no fixed point behind which it will bend or break, but the "snap" with which the dislocation is reduced will be sharper than that on the inner side, owing to the different shape of the two semilunars on cross section as shown on Plates XI and XII

An extreme form of this injury appears in a museum specimen described by Godlee, and has once been found at operation by Logan Turner 25 It corresponds to the dislocation of the internal cartilage shown in Plate XXV

To allow anterior dislocation of the external semilunar, both the anterior crucial and the external lateral ligaments must be looser than normal. These two may be ruptured by extreme internal rotation combined with adduction, according to Segond.

If the femoral condyle overrides and settles down behind

its semilunar, and extension occurs while the joint is loaded heavily enough, the cartilage may be torn from its peripheral attachment and folded over into the notch. Otherwise, the dislocation will be reduced with the "snap," which accounts for the name "jerking" or "trigger" knee.²⁷

It is possible that looseness of the external lateral ligaments may permit of sufficient external rotation to allow of a backward dislocation of the anterior portion of the external semilunar during extension, but no evidence of such a condition was recognized in these joints, and no such joint is described in the recent literature.

The only injury found exclusively on the external semilunar cartilages was a transverse tear at the junction of the anterior and middle thirds. This was seen in three joints of the four in which the tough fibrous tabs were found external to the ligamentum mucosum. It is possible that these tears may have resulted from the inclusion of such a mass within the well-fitting semilunar ring during extension, or when landing on the feet after a fall from some height. This connection was not noticed until the notes were tabulated and the joints thrown aside.

One hundred and twenty-eight operations on the semilunar fibrocartilages have been gathered from the reports of forty-seven different operators.

The pathological descriptions are so unlike that an accurate grouping of the conditions is almost impossible. The following is presented as approximately correct:

Torn from or near anterior attachment. Transverse tear at or near lateral ligament. Longitudinal split, incomplete Longitudinal split, complete Turned into intercondylar notch Loose and sewn to tibia Cystic Ossified Doubtful	38 16 8 3 23	External. 3 1 1 1 5
٠.	113	15

The "loose cartilage" is the most difficult to understand, for the anterior portions of both semilunars are normally loose in certain positions of the joint, and an increase in this would seem to involve a tear Possibly such a tear might show on the under side of the semilunar, as in the cases seen by Barker 12 and in certain of my specimens

Schaeffer 28 and others have treated mechanically disabled knees with an apparatus which permitted flexion while preventing external rotation and limiting extension and lateral mobility If the disability be in the early stage before damage to the semilunar has occurred, this treatment has much in its favor, but if the semilunar has been fractured or torn off its anterior insertion, it is not easy to see how any apparatus can bring about a permanent cure even in function

The exact diagnosis of semilunar injuries is as yet seldom attempted before opening the joint, and has often been uncertain even then There is hope that by a careful study of the exaggerated movements, we may learn to locate the damaged ligaments, and thereby to reason out the semilunar mury resulting

Suture of damaged cartilages has often been attempted, but it is worth attention that in later operations by the same men the damaged portions were removed. The opinion that removal is preferable to suture is now practically unanimous

Thirteen days after injury, Battle 21 sutured both crucials to the femur and the internal lateral at some point, with good result Two joints in my collection showed the results of rupture of the anterior crucial ligament

On the other hand, cases of dislocation like Bergman's,29 where the internal lateral and both crucials must have torn, and like Eames's,30 five miners with the same injury, show that there are two sides to the question of repair These six were all treated without opening the joint, and all recovered with useful knees

Ligamentous damage of any degree must be followed by swelling With a certain grade of injury the swelling takes the form of an effusion within the joint. The more slowly the joint fills, the smaller will be the proportion of blood in the fluid. Pure blood has been aspirated from joints which filled within an hour after injury.

Lübbe ⁵ concludes, from a case reported by Kocher and one of his own, that blood may remain fluid in a knee for twenty-one days, or it may show clots after one day. He thinks the rapidity of clotting is directly proportional to the area of injured synovial membrane. He quotes Volkman as finding large masses of blood-clot as well as strong adhesions fourteen weeks after a contusion, while Delbastaille found that fluid blood in a very slightly injured knee was absorbed, except some pigment, within twenty-eight days. He believes that the rapidity of absorption is in inverse proportion to the synovial injury.

Three methods of treatment for these acutely distended joints are in use:

- 1. Rest followed by massage and movements. Lübbe be reports an average hospital stay of 34.6 days for twenty-two patients at the Seaman's Hospital in Hamburg, and thirty-eight days at a Copenhagen Hospital under this treatment.
- 2. Aspiration, repeated, if necessary, to relieve the distention and remove a material which would discourage movement and encourage the formation of adhesions.

From the Hamburg Hospital, Lübbe ⁵ reports an average stay of 25.5 days for thirty-two patients aspirated, and 22.4 days for the aspirated cases under Bondeson at Copenhagen. The great majority of writers ³¹ on this part of the subject favor aspiration, regarding it as safe if carried out with the most perfect asepsis, as shortening the time for recovery, and as giving better functional results.

3. Incision with drainage. O'Conor ³² is the most vigorous advocate of this procedure, and his conclusions after twenty-two successful consecutive arthrotomies are worth repeating.

[&]quot;The question of draining gonorrhœal joints is settled."

29

"Washing out blood clots from an injured joint is a surgical obligation" "Traumatic water on the knee' is best treated by arthrotomy and drainage"

He irrigates all his open joints with 1 to 1000 sublimate solution, and drains them until nothing but normal synovial fluid comes from the wound

Whichever of these three methods be employed, the great probability of ligamentous injury ought to be kept in mind, an accurate diagnosis of the location and extent of the damage should be sought for by testing the joint for exaggerated movements, and the treatment should be directed not only towards an immediate recovery of function, but to the end that the ligaments may preserve the joint against further dis ability in connection with the semilunar fibrocartilages

It may be that within a few years the early opening of these joints with immediate repair or removal of damaged structures will be the definite rule of procedure

The writer believes that early or late repair of the internal lateral ligament, which is certainly the most accessible and probably the most frequently injured, will prevent some of the disability now caused by dislocation of its semilunar, and that in some cases it will be found to be a "surgical obligation"

FREE AND LOOSE BODIES

Among my specimens there were but two which showed free bodies in the John In both they were small and numerous, and in both there was decided "lipping" of the mar gins of articular cartilage Berry 33 removed 1047 free bodies from a joint which four years earlier had furnished him fifty These consisted of a nucleus of cartilage surrounded by fibrous tissue and varied in size from a fine bead to a pea

Thompson 34 removed several hundred from another joint, of the same structure with scattered areas of calcification

Bazy 32 argues from his study of a similar case that these multiple bodies are the result of a dry arthritis with overgrowth of the articular cartilage at the margins Fowler ⁸⁶ regards these as arising from embryonic cartilage cells in the synovial membrane.

The bony and cartilaginous masses found by Fredet,³⁷ Jaboulay,³⁸ Codman,³⁹ and many others are apparently of a different origin, and represent pieces of articular cartilage knocked off by direct violence, or pulled off with some ligament with or without bone tissue.

While these may consist of one, two, or even more fragments, they are not multiple to the extent found with the other type, and of course do not reappear as do the others.

Operations for removal of these bodies was successfully performed previous to 1803, according to William Hey.

Woodward 40 says that in 1860 Larry collected 131 operations for simple removal of free bodies. Where attempt was made to remove the body by direct incision 74 per cent. were cured, 4 per cent. were unsuccessful, and 21 per cent. died. The subcutaneous operation in two stages gave 49 per cent. cured, 38 per cent. unsuccessful, and 13 per cent. of deaths. Woodward collected 104 cases up to 1889 with six poor results, two amputations of the thigh, and one death.

Marsh ⁴¹ found seventy-two cases between 1885 and 1895, with no deaths, and sixty-two perfect recoveries.

I have tabulated 297 cases, all reported since 1895, including all sorts of operations on non-purulent knee-joints, with six resulting in ankylosis, no amputations, and no deaths. Operative removal of these free bodies is the only treatment to be considered to-day.

INCISIONS

The uncertainty of our present methods of disinfecting the skin makes it desirable to arrange that the skin sutures shall not follow the lines of the incision in the capsule. This is accomplished by making a U-shaped flap of skin and turning it up or down to expose as much of the deep fascia as is necessary.

Incision 1. Beginning at the inner border of the patella, a finger's-breadth below its upper border; the incision runs downward nearly to the tibia, and then backward above the

internal semilunar to the internal lateral ligament. It can be extended above at the expense of the internal lateral ligament of the patella and back into the lateral ligament of the point if necessary. This will expose the anterior two thirds of the internal condyle, the anterior half of the internal semiliunar, the lower portion of the anterior crucial ligament, the mu cosum, and the inner half of the infrapatellar pad in its natural relations.

Incision 2 This begins with extended knee at the upper end of the outer border of the patella, passes downward to the upper border of the external semilunar, then backward along this upper border to the external lateral ligament. If this incision be carried up a little through the extensor fibres, it will expose the suprapatellar synovial pad. Otherwise, it will expose the anterior two thirds of the external condyle, the anterior half of the external semilunar, the mucosum, and the outer half of the infrapatellar synovial pad in its natural position. The patella can also be tipped up so that practically the whole of its posterior surface can be examined.

Incision 3 This is made along the anterior border of the biceps, with extended knee, down to the capsule. Flexing the knee allows the biceps to pull back out of the way and the liotibal band to partially cover the field. This latter can be nicked and drawn out of the way. The capsule is now lax and can be opened either above or below the poplities tendon. Below the tendon the incision opens into the pocket under the poplities, which in the ordinary bed position is the lowest portion of the joint cavity. Through Incisions 2 and 3 the whole or any portion of the external semilinar can be removed.

Incision 4 With extended knee this follows the anterior border of the sartorius down to the capsule. The muscle draws back as the joint is flexed and the capsule may be opened behind the main part of the internal lateral ligament, either above or below the semilunar. Through Incisions I and 4 the whole or any part of the internal semilunar can be removed.

The two posterior incisions in the capsule are short and give a small field for operation, but are sufficient for the purposes above mentioned, and will allow gauze drainage from the dependent part of the cavity, provided the joint is allowed to rest partially flexed. Otherwise, the two posterior hoods are in close contact with the femoral condyles.

A possible form of drainage is continuous irrigation, in through one posterior incision and out through the other. The fluid in this case would wash practically every portion of the synovial membrane, except, perhaps, the bursa, under the quadriceps.

The joint has often been opened by one of three transverse incisions which pass either above, below, or through the patella. Niehans ⁴² has suggested a long vertical cut internal to the patella which turns out at a right angle below the tibial tubercle. The patellar tendon is then chiselled from the tibia and turned up with the patella and front of the capsule.

These extensive incisions are not necessary for complete examination of the joint. The large openings increase the possibility of infection from the air, the operator, or assistant's mouth, and other sources. They prolong the period of immobility, and without exception they give a distorted view of the relations of the fatty pads to the articular surfaces.

A transverse incision may be found necessary to complete the operation in some cases. Under these conditions, the writer believes that sawing of the patella just below its middle, or preferably the section of the patellar tendon immediately below the bone, avoiding injury to the infrapatellar pad, will give the maximum of working-room with the minimum of later inconvenience in the use of the joint.

The writer desires to acknowledge his indebtedness to Professor Thomas Dwight for opportunity and material, to Dr. Franklin Dexter for the encouragement which started the investigation, to Dr. Harold C. Ernest for the use of his photographic apparatus and laboratory, and to Dr. S. B. Wolbach for the skill and patience which show in the photographic work.

REFERENCES

- Poirier Progres Med , Paris, 1886, 2 S , m, P 331 et seq
- *Higgins Journal of Anatomy and Physiology, London, xxix, 1894, 1895, pages 390~398
- Pauzat. Revue de Chirurgie, 1895, p 97.
- *Wood's Medical and Surgical Monographs, 1890, Vol vii, pages 407 et seq
 - *Lubbe Deut Zeitschrift fur Chir, Leipzig, 1898, xlix, p 614
 *Piequé Bull et Mémoirs Soc de Chir, Paris, 1898, xxiv, p 825
 - Meisenbach St Louis Courier of Medicine, 1886, xv. p 411
- 'O'Conor Glasgow Medical Journal, 1896, xlv1, p 438
- Hoffa Betlin klin Wochensch, xli, No I, and Therap de Gegenw,
 Berl Wein, 1003, xliv, 14
- Goldthwait Transactions of American Orthopædic Association, Philadelphia, 1901, xiii, 25
- "Turner British Medical Journal, October 13, 1898.
- 18 Barker Lancet, 1902, 1, pages 7-10
- 15 Segond Progres Medical, 1879, p 321 et seq
- "Bonnet Quoted by Segond
- 18 Pagenstecher Deut, med Wochenschrift, Leipzig, 1903, xxiv, p 872
- "Hoenigschmied Deut Zeitschrift f Chir, 1893, xxxvi, p 610
- "Jersey New York Medical Journal, 1881, p 633
- ¹⁸ Larsen Deut med Zeitsch, April 24, 1890

 ¹⁸ Swan Transactions of Royal Academy of Medicine, Ireland, Dublin,
- xviii, p 143

 ** Fürbeck. Transactions of Medical Society, New York, 1901, p 376
- Battle Transactions of Clinical Society, London, xxxiii, p 232
- "Robson Annals of Surgery, xxxvii, p 716
- "Hints Archiv f klin Chirurg, 1901, lxiv, p 980
- "Croft Quoted from Allingham's Monograph
- "Logan-Turner Edinburgh Hospital Reports, Vol 11, p 561
- "Godlee Transactions of London Pathological Society, xxxi, p 240
- "Cotton Jour Boston Soc Med Sciences, May, 1899
- "Schaeffer Annals of Surgery, 1898, xxviii, p 417
- "Bergman Monatschr fur Unfallkeit, Leipzig, 1902, 1x, p 16
- ⁴⁰ Eames British Medical Journal, 1900, 1, p. 958 ⁴¹ Picque Bull et Mém Soc de Chir, Paris, 1898, xxiv, p. 825
- Lauenstein Centralblatt f Chir, Leipzig, 1901, xxviii, p 153
 Trimble Annals of Surgery, 1903, December 12
- O'Conor Glasgow Medical Journal, 1898, xlix, p 353
- Berry British Medical Journal, May 19, 1894
- **Thompson Transactions of Medico-Chirurgical Society, Edinburgh, 1901, xx, p 107
- Bazy Bull et Mem Soc de Chir de Paris, 1902, xxviii, p 922
- "Fowler Georgia Journal of Medicine and Surgery, May, 1901
- "Fredet Bull et Mém Soc Anat de Paris, 1901, lxxvi, p 44.
- "Jaboulay Lyon Médicale, 1903, P 295

- 30 Codman. Boston Medical and Surgical Journal, 1903, p. 427.
- 40 Woodward. Boston Medical and Surgical Journal, April 25, 1899.
- ⁴¹ Marsh. British Medical Journal, March 5, 1898.
- ¹² Niehans. Centralbl. f. Chir., Leipzig, 1897, xxiv, p. 457.

OTHER REFERENCES.

ANATOMY.

Morris. Human Anatomy and Anatomy of the Joints.

Gray, Quain, McClellan, Deaver, Gerrish, Testut, Tilleaux, Poirier, and Spalteholz.

Monographs.

Des luxations des Cartilages Semilunaires du Genou, etc., Lenail, Lyons, 1808.

Die Erkrankungen des Kniescheibenschleimbeutels und ihre Behandlung Kurbs., Jena, 1894.

FREE BODIES IN JOINT.

Schuller. Centralb. f. Chir., February 29, 1896.

Schmidt. St. Petersb. med. Woch., 1902, xix, p. 19.

Brewer. Annals of Surgery, 1901, xxxiv, p. 423.

Van Huellen. Beitrag. z. Path. Anat. u. z. Alg. Path., Jena, 1902, xxxii, p. 556.

Rigal. Lyon Médicale, 1903, p. 574.

Le Dentu. Bull. et Mém. Soc. de Chir. de Paris, 1902, xxxviii, p. 246.

Hæmarthrosis.

Fagan. British Medical Journal, September 22, 1883. Trimble. American Medicine, December 12, 1903.

Semilunar Injury.

Schultze. Archiv. f. Orthopadie Mech. Therap., etc., Band i, Heft 1.

Cotterill. Lancet, 1902, i, p. 510.

Lauenstein. Deut. med. Woch., 1890, p. 9.

Garré. Deut. med. Woch., 1903, xxix, 245.

Lane. Clinical Journal, London, 1900, xvi, p. 103.

Erdmann. Annals of Surgery, 1903, xxxvii, p. 606.

Johnson. Annals of Surgery, 1903, xxxvii, p. 773.

Blake. Annals of Surgery, 1903, xxxvii, p. 934.

Owen. Lancet, 1900, i, p. 1183.

Halstead. Chicago Medical Record, 1900, xviii, p. 325.

Porter. Boston Medical and Surgical Journal, clxii, p. 298.

Kummer. Rev. Med. de la Suisse Romande, 1898, vi, p. 326.

Lardy. Rev. de Chirurgie, 1894.

Griffiths. British Medical Journal, 1900, ii, p. 1171.

Peckham. Therapeutic Gazette, Detroit, 1902, xviii, p. 466.

Bennett. Lancet, 1900, p. 1.

Abbott. Journal of American Medical Association, 1903, xl, p. 1131.

Niehans. Centralb. f. Chir., Leipzig, xxiv, p. 457.

Jalaguier. Bull. et Mém. Soc. de Chir. de Paris, 1900, xxvi, p. 279.

SOME REMARKS ON TUMORS OF THE CHIASM, WITH A PROPOSAL HOW TO REACH THE SAME BY OPERATION:

BY OTTO G T KILIANI, MD,

OF NEW YORK

Surgeon to the German Hospital

I wish to report briefly a case of tumor of the base of the brain which came to my observation recently, and will close my report by a few remarks on tumors of the chiasm in general, and a proposal of how to reach such tumors by operation

The case in question is as follows

G L, aged sixteen years, was admitted to the German Hospital, December 9, 1903, and died December 12, 1903. The patient was first seen on March 10, 1903, by an ophthalmologist, Dr Denig, to whom I am indebted for the following notes. The patient complains of poor vision for five months, since that time has had from four to seven attacks daily of neuralgic headache Got into the habit of shaking his head at times, and of holding it turned slightly to the right. When five years old he went through an alleged attack of meningitis

Vision Right, minus 05 minus cyl 225, horiz vision, 1/3
Left minus 05, minus cyl 1 horiz vision, 1/3

Pupils normal, perimetrical examination shows bitemporal hemi anopsia, and right optic nerve shows a varicose vein Probable diagnosis old meningitis with hydrocephalus internus, or, more probably, tumor of the chasm, possibly with varicosity Optic normal (I include drawings of the results of the perimetrical examination) (Figs 1 and 2)

Dr George W Jacoby, to whom the case was sent, takes the matter for a residuum of the menungitis which the boy experienced

¹ Read before the New York Surgical Society, February 24, 1904

at the age of five. To exclude acromegaly, thyroid tablets are given. On the 28th of July, the vision on the right side ½, left ¼, a perceptible diminution. Slight hyperæmia in the vessels of the fundus. On December 8, the same vision as at the last examination. No other changes, except an increase of headaches. Had another consultation with Dr. Jacoby. Drs. Jacoby and Denig concur in the diagnosis of tumor of the chiasm, and decide on an operation to relieve pressure, with a view to a trial to extirpate the tumor.

My examination of the patient on December 10 showed the following: Family history negative; the personal anamnesis being the same as above, except that projectile vomiting has to be mentioned, which occurred daily during the last six months. present he has paroxysmal headaches every few minutes, which are, at the time of the intended examination, so strong that it has to be postponed; the patient being practically unconscious, or at best semi-unconscious. The hemianopsia is progressive, with marked primary atrophy of the hemianoptic fields, and slight hyperæmia. The knee-jerk and foot clonus are exaggerated, especially on the right side. No sensory disturbances. Slight optic atrophy, more marked in the right eye. Exophthalmus of right eye, pupils react equally to light; no oculomotor disturbances. Heart normal. Diagnosis: tumor of the hypophysis reaching to the anterior angle of the chiasm of the optic nerves, with pressure on the same. I may be permitted to state that bitemporal hemianopsia means blindness of both nasal halves of the retina.

After due consideration of the case and a consultation with the father of the patient about the chances of a removal of the tumor, this operation was decided upon.

The way to reach the chiasm in an operation is rather unexplored; and, while I have made a number of experiments to this purpose, some further operations on the cadaver were considered necessary, and the operation on the patient was therefore postponed a few days. During the night of December 11–12, that is two days after admission, the entire clinical aspect of the case changed suddenly. The temperature, which had been normal before, rose to 104° F., and the patient's condition became semicomatose. The right pupil was widely dilated, while the left presented the size of a pinhole. All four extremities were paralyzed to a certain extent. These symptoms indicated a perfora-

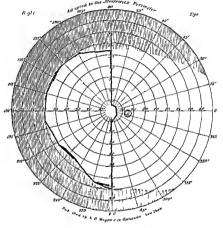


FIG 1-Perimetrical examination of right eve

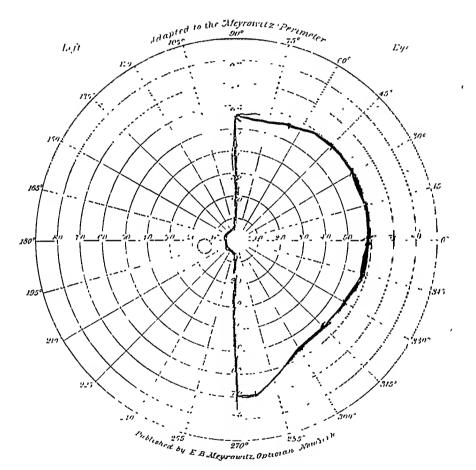


Fig. 2.—Perimetrical examination of left eye.

tion of the tumor, possibly cystic, into the lateral ventricle, eventually hemorrhage into the same. For that reason an immediate operation was decided upon to relieve the pressure on the ventricle. The condition of the patient was so comatose that it was deemed possible to operate without narcosis, but shortly before the operation he revived so far that a slight chloroform anæsthesia became necessary.

Right side osteoplastic flap, after Wagner, was made with Sudek's fraise, with electric motor, to puncture the ventricle and to relieve pressure. The ventricle was struck without any difficulty, but only a few drops of serum appeared through the cannula. The patient's condition forbidding any further interference, none such was attempted. Replacement of the flap, dressing, patient put to bed. Temperature kept on rising, condition of the patient stayed the same till, eight hours after the operation, exitus took place.

Autopsy, by Dr Schwyzer—Cadaver of a moderately large boy, no œdemata, no atrophy Skull shows small Wagner flap on the right side. Cranium not quite symmetrical, right occupital portion somewhat larger than left, bones remarkably thin, the dura tense, rather moist, vessels of the dura rather empty, sinus longitudinal, contains no blood, the lymphatic vessels appear to be imbibed with blood. Subdurial space fairly moist, pia shows considerable arterial and venous injection. At the right side under the dura, corresponding to the parietal flap (which corresponds to the flap moisson), is a plaque of coagulated blood of the thickness of several millimetres.

The corpus callosum, especially m its anterior portions, arches forward and appears quite resistant. After the brain has been removed, a round, dark tumor of the size of a plum is discovered in the region of the Chiasma opticorum. (Figs. 3 and 4)

Both olfactory nerves apparently unchanged The optical nerves appear to be spread and extend backward in a sagittal direction before converging

To the right and left upon the cystic tumor protuberances like varices appear, which are filled with dark colored blood, partly fluid, partly coagulated

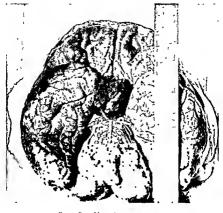
Puncture of the central portion of the tumor in the median line reveals a thick, bloody fluid containing many small, yellowish particles of tissue and fat crystals The tumor before incision was almost round, with a longitudinal diameter of about four to five centimetres; its anterior walls are quite thin.

The Sella turcica is remarkably deep, its posterior edge is corroded, quite sharp and projecting straight upward. The anterior edge also shows a distinct line of corrosion. The Sella turcica measures almost 3 centimetres in a sagittal direction, 3.5 centimetres across, and 1.5 centimetres in depth. The hypophysis cannot be found, so that the tumor must be looked upon as a tumor of the hypophysis. The portions of the tumor which lie in the lateral depressions of the Sella turcica, and the posterior parts of the tumor, contain grayish-red tissue, which, however, does not represent coagulated blood. The lateral sinuses contain fluid blood.

The left lateral ventricle contains a little clear fluid, the right a few drops of the same.

Addenda.—The tumor has a length of 41/2 centimetres, a width of 2½ to 3 centimetres, and about an equal height. The olfactory nerves are not attacked, but the region of the Chiasma opticorum is involved. The veins at the base of the cranium (sinus cavernosus) are enormously dilated, and stretch in thick cords transversely above and below the tumor. The sinus intercavernosus anterior and posterior, especially, are transformed into wide canals. The tumor itself represents a cyst-like swelling filled with partly coagulated, partly half-fluid blood. In removing the brain, a small rip of the cyst occurs, from which soft, partly black, partly brown coagula and fluid blood are evacuated. conjunction with these substances, soft gelatinous tissue of yellowish and brownish color are found, which represents the tissue of the cyst. The tumor is most firmly adherent to the Chiasma opticorum. An attempt to sever the tumor from the latter shows that the anterior branches of the chiasm are intact, while the posterior portions are wanting, i.e., they seem to disappear in the cyst. No trace of the hypophysis can be found.

Microscopical examination of the cyst shows that the anterior portion of the tumor is practically one cyst, filled with blood; in the posterior portion it is solid tissue. The coagulated blood contains small particles of tissue, some of which possess the character of papillæ of cystadenoma. The wall of the cyst in its outer portions consists of fibrillary multinuclear connective tissue, while the inner layer is formed of small-celled tissue. The posterior



 $\Gamma^{_{1G}}$ 3—Ease of brain showing tumor in situ



Fig. 4.—Tumor dislodged and held to one side by a pin, showing course and condition of optic nerves.

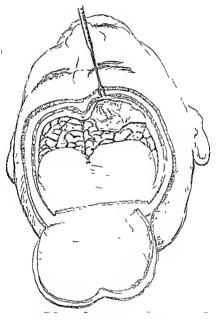


FIG 5 -- Proposed method of reaching tumors of the optic chiasm

portions of the tumor show glandular tissue here and there, with cystic spaces filled with large colloid masses and with large epithe lood cells. Often the structure of a cystadenoma is clearly shown but the adenoma cells are relatively small. The stroma of the entire tumor consists partly of pigmentary cells, many parts of the posterior portion are more like connective tissue, with many blood vessels and no glandular character, so that they might almost be looked upon as sarcomatous tissue.

Diagnosis —Adenoma of the hypophysis with colloid de generation resulting in compression of the basal venous system and partial destruction of both optic nerves. Finally a hæmor rhage in the cysts of the tumor led to a rapid increase of volume with almost complete interruption of the optic nerves.

I may state right here that the rather unusual character of the tumor with its enormous vascularization would have forbidden absolutely any attempt to remove it, as a fatal hemorrhage would have followed any such attempt most assuredly

In looking through the literature, I found quite a large number of cases of tumors of the region of the chiasm. While I have not been able to follow all these cases. I have personally been able to trace forty two, quite a large number of which are cases of acromegaly, the others being tumors of the pituitary body without any symptoms of that disease. It is therefore only natural to consider the possibility of reaching these tumors by operation, and I dare say that if most of these cases did not come under the observation of the nerve and eye specialists, as is natural, the idea of an operative interference would probably have been approached before, if such has been the case, I am not aware of it, at least I have not been able to find anything about it in the literature.

If the region of the chiasm can be reached at all for technical or anatomical reasons the operation may be indicated either for purely symptomatic causes or for curative purposes. The presence of a tumor at the chiasm probably never makes itself manifest till pressure on the optic nerves cisues. There fore an operation would in a certain way always have to be for

symptomatical reasons; this all the more as the tumors of the hypophysis have not the tendency to sarcomatous degeneration common to other parts of the brain. This is another reason which makes these operations appear desirable, as the final prognosis is decidedly better and more encouraging than with other parts of the brain, these tumors proving to be of a nonmalignant character. The question of acromegaly and its possible treatment or cure by operation on the hypophysis is a matter rather difficult to discuss as long as the opinions about the etiology of that disease are so divided. If hypertrophy of the hypophysis is only one of the symptoms of acromegaly, like the hypertrophy of other extremities, operative interference for total or partial removal would not be indicated until the tumor exerts pressure on the chiasm. If, on the other hand, the disease, as such, was produced by the original hypertrophy of the pituitary body, an early operative interference might be of some avail.

The reason why tumors of this locality have so seldom been operated upon lies entirely in the difficulty of reaching them. The attempt to get at the chiasm by a temporal flap, lift up the temporal lobe of the brain, and work one's way along the pars petrosa of the temporal bone is frustrated by the extremely dense adherence of the dura to the bone. Even if we should succeed in reaching the anterior foramen lacerum between the canalus caroticus and foramen ovale, we would find ourselves behind the Sella turcica, in fact, behind the processus clinoidus posterior. Besides, a very large side flap would have to be made in order to lift up the brain high enough not to work entirely in the dark.

Several years ago I was impressed with the desirability of reaching the chiasm, and therefore tried the following modus: A modified operation after Kroenlein's method for reaching the rear parts of the orbita was considered feasible by combining it with a large frontal flap. The idea was then to break this large frontal flap downward in such a way that, after its detachment from the zygomatic process, it could be turned downward forward, bringing with it the entire upper

roof of the orbita This operation having been done several times on the cadaver, it was attempted in a case where the diag nosis of tumor of the chiasm was made. The operation had to be discontinued, as it was impossible to break out the flap The autopsy showed that an enormous sarcoma of the brain existed, with no symptoms except those produced by pressure on the chiasm, combined with a very extended osteosarcoma of the skull, which easily explained the impossibility of breaking out the flap But I have convinced myself since then that any extra dural operation is without value in an attempt to reach the chiasm, as the same difficulties meet us here that we find in the operation with the side flap, namely, the dense attachment of the dura to the bone. Therefore intradural operations had to be decided upon for this purpose Besides, there is another objection to this way of opening the skull, as many surgeons may be loth to break the roof of the orbita in the proposed fashion, as one cannot be reasonably sure how it is going to break, and even possible injury to some of the veins may result

I therefore came to the conclusion that the only rational way of getting at the chasm was in the following manner. A Wagner flap is formed on the frontal bones with true omega shape, the base of which hes about half an inch behind the sutura coronaria, the indentation of the omega comes to be exactly in the median line, to avoid, if possible, the opening of the smus frontalis. The dimensions of the bone flap thus formed are in the median line, 5 inches, the lateral diameters being 5½ inches, the width 7 inches, and the base where it is broken off 3½ inches. The skin incision severs the temporal artery on both sides. The opening of the skull is made with a Sudek's fraise with electric motor beginning at the base of the flap, the fraise is then led on forward, following closely the line of the omega formed in such a manner that the distance of the horizontal branches from the orbital margin is three quarters of an inch, then going upward to describe the indentation for the purpose of avoiding the sinus, thus reach-

ing a height of one and one-half inches from the root of the nose. The other half of the flap is symmetrical.

After a number of discouraging experiments, I have been able to bring the time for cutting the bone down to eight minutes.

The failures in my former experimental efforts were due entirely to the fraises not being sharp enough and too softly tempered. The electric motor is of one-quarter horsepower with the usual 120 voltage of the street current. attach a great deal of importance to the quick work of the fraise, because the danger of forming such a large flap is decidedly lessened if there is less loss of blood by quick work. Any injury to the dura can easily be avoided if the instruments are well made, that is, if the protective knob of the fraise is perfectly smooth. After this a Gigli director is inserted from the starting to the finishing point, and the flap sawed through, or at least partially. After breaking the flap, the incision in the dura is made, following the line of the bone closely in the distance of half an inch up to the median line, where the sinus is left intact. The other half of the incision is symmetrical to the first. We now tie the longitudinal sinus, which is only a small vein at this place. The ligation is best made by first applying two clamps, between which the falx is cut through, and then the ligatures applied. The dura need not be dissected back any further, thus avoiding undue oozing. Now begins the work of the lifting up and out of the frontal lobe of the brain, which is done with two brain spoons. The frontal lobe can thus be shoved back without any trouble or hæmorrhage, till the optic nerve comes into view. The only disadvantageous thing liable to happen is the tearing off of the olfactory bulb of one side. I have used this method now repeatedly on the cadaver, and cannot find any objection to it, as far as one can judge from operations on the cadaver. (Fig. 5.)

The principal danger in most brain operations is, of course, hæmorrhage, but during the steps described it is almost inconceivable that a hæmorrhage of any importance can occur. Thus far I have only described how to reach the anatomical

point desired What is then to be done depends on the char acter and size of the tumor to be found. The danger of haemorrhage now to be encountered is especially from the intercavernous sinus. Cysts of the hypophysis, which are not at all infrequent, would of course lend themselves most easily to treatment by evacuation, while adenomata, if they are not too hard, will permit of a partial removal by the sharp spoon Any hæmorrhage occurring now, I would try to stop by tem porary tamponade, and finally by laying a thin piece of rubber tissue on the surface, and allowing the brain to drop back into place

I am quite aware how awkward it must appear to recommend an operation which I have only been able to try on the cadaver. But these cases are, after all, not so frequent that one surgeon would see many of them. Therefore I bring this operation to the attention of surgeons.

PRIMARY CHOLECYSTECTOMY: SCOPE, METHOD, AND RESULTS.1

CONCLUSIONS FROM FORTY-TWO CASES IN THE PRACTICE OF THE AUTHOR.

BY HOWARD LILIENTHAL, M.D.,

OF NEW YORK,

Attending Surgeon to Mount Sinai Hospital.

THE subject of gall-bladder surgery has become altogether too extensive to be considered in any paper of ordinary length. It will be best, therefore, to take one phase of the subject, even though it be but a small part of the whole, and, in viewing this from the stand-point of individual experience, we shall, perhaps, find interest and profit.

The following paper is based upon my own work in primary cholecystectomy gained from forty-two cases in which this operation was performed.

Courvoisier, in an article on cholecystectomy in Kocher's "Encyclopædia of Surgery," states that the first extirpation of the human gall-bladder was performed on July 15, 1882, by Langenbuch. His example was soon followed by Courvoisier, Riedel, Thiriar, and Krönlien.

The operation as a primary procedure has for some reason not become popular. The indications for its performance as stated by various authors (Riedel,² Davis,³ Kehr,⁴ W. J. Mayo,⁵ Courvoisier,⁶ M. H. Richardson,⁷ and others) embrace:

First. Serious injuries of the gall-bladder. Second. Grave diseases of the gall-bladder, such as suppuration, atrophy, and cancer. Third. Repeated or complicating gall-stone disease. Fourth. Obliteration of the cystic duct.

Practically, all agree that ulceration and gangrene are indications for the removal of the organ, but Ochsner 8 says:

¹ Read before the New York Surgical Society, March 9, 1904.

"It is not wise to operate during the acute stage of cholecystitis," an opinion not verified clinically by the writer

Nearly all authors seem to regard cholecystectomy as a graver surgical procedure than cholecystotomy, and some seem to consider it even more serious than choledochotomy

It is my conclusion that extirpation of the gall bladder in non-cancerous cases is a very safe operation, and that it is far more satisfactory in suppurative, calculous, and atrophic conditions than cholecystostomy

Riedel, in his recent monograph on gall stone disease, states that, because the extirpation of the gall bladder requires an incision from thirty to thirty five centimetres long, the operation cannot be compared with collecystostomy performed in two stages. I fully agree that if we subject the patient to the terrible shock of a fifteen inch abdominal wound, especially in septic or weak individuals, the mortality will be far greater than if a cholecystostomy is performed through a four-inch opening. If, however, we can with speed and comparative ease extirpate the organ through the smaller incision, thus completely eliminating a septic focus, and if at the same time we can assure ourselves by actual inspection and all other tests that the common duct is free, and if we can at once remove obstructing stones from the common duct either by incision or by manipulating the calculi out by way of the cystic, it seems to me that the choice of operation must be in favor of the more radical procedure.

Roughly speaking, the cases may be divided into two classes, viz., those in which active infection is present and those in which there is no active infection. If there is no active infection, the matter of drainage of the bile ducts be comes unimportant, and one may as well remove the diseased organ which once has shown a vicious tendency. Yet, even in the second class, when active infection is present, it seems also wise to remove the septic viscus, and, if necessary, drain the biliary system, provided the anatomical conditions are not such as to make prolonged and difficult manipulation necessary. If actual gangrene is left behind, it will continue to be

a serious menace, even though the gall-bladder is thoroughly drained; and, if this gangrene, though very extensive, does not involve the serous coat, one may perform cholecystostomy and never actually know that the gangrene exists.

When for any reason drainage of the biliary system seems desirable, it can be easily accomplished by means of a tube in the hepatic duct; but it seems reasonable enough that when the common duct is free the best drainage of all is the natural one through that structure into the intestine. The only exceptions to this are, first, the presence of septic cholangeitis, which is, in any event, probably the most serious of the biliary diseases. Here we may then divert the flow of infectious material directly to the outside of the body. And, second, when there is reason to suppose that fragments of calculi have slipped out of reach into the hepatic duct.

Richardson, 10 in discussing cholecystectomy, mentions three disadvantages:

First. That there is no possibility of draining the biliary passages except through one of the ducts, and that only after a difficult and unsatisfactory operation.

Second. That there is greater danger in the operation.

Third. That redrainage of the biliary passages is extremely difficult and dangerous.

As to the first of these alleged disadvantages, it seems to me that the drainage of the biliary passages by tube at one sitting with a cholecystectomy is far from difficult, and is extremely satisfactory.

As to the second objection, that of danger, I can but say that since I have performed cholecystectomy as a primary measure, my mortality rate in diseases of the biliary passages has fallen materially.

The third objection is perhaps valid, but I have never found it necessary to redrain.

The same writer states that he has never had occasion to suspect recurrence of gall-stones after cholecystostomy and drainage, and W. J. Mayo ¹¹ has collected 2000 operations in the hands of six surgeons with no instance of re-formation of

calculi It would be interesting to know whether in these 2000 cases there has been no recurrence of biliary colic, for it has seemed to me far from rare to hear of pain, in some instances quite severe, after almost any operation for gall stones. To be sure, this pain has been variously explained as being due to adhesions, to mucus, etc.

It has been my observation that after cholecystostomy secondary operations have not infrequently been necessary, either on account of recurring infections or because of trouble some fistulæ. No secondary operation has been required in any of my patients who have been discharged after cholecys tectomy.

My list comprises forty two cases counting only those in which the operation has been performed as a primary meas ure not after other operative attempts at cure or palliation. The first operation was on May 15 1900, and twenty five were done since December 1, 1902. Of the total number twenty nine cases were operated upon during the progress of acute active infection and thirteen were in the chronic or latent stage of infection. In one instance belonging to the latter class the gall bladder was removed although apparently not diseased.

Of the total number there were ten males and thirty two females. The youngest patient was a girl eleven years old whose history has been elsewhere recorded 12 and who had suffered for years from cholehthiasis. The oldest was a man of saxty eight with acute calculous cholecystitis and empyema of the gall bladder.

A lustory of antecedent typhoid was obtained in eight cases (10 per cent)

There was gangene of the viscus more or less extensive, in seven of the cases Choledochotomy was performed six times together with cholecystectomy Marked jaundice was present in fourteen of the patients Draininge of the hepitic duct by tube was practised twice. There was a recurrence of pain resembling colic in six of the cases but in only two did jaundice occur. One of these pitients passed two stones after

the cholecystectomy, but her operation was performed before the elaboration of the method which I now employ.*

The most noteworthy postoperative complication has been a bronchopneumonia, usually on the right side. It was encountered five times.

There has been one death. It was due to streptococcus infection existing before the operation.

In my division at the Mount Sinai Hospital the usual procedure in cases of gall-bladder infection with or without calculi is extirpation, and since adopting this practice the percentage of deaths has steadily decreased. In short, I firmly believe that primary cholecystectomy in the majority of cases is safer than any other operation on the bile passages, even when complicated by jaundice or grave sepsis, and when such procedures as appendicectomy, choledochotomy, gastrorrhaphy, or duodenorrhaphy must be performed at the same time.

Up to the present writing the types of gall-bladder disease which are not considered suitable for cholecystectomy are the following:

First. Extensive carcinoma with involvement of neighboring viscera.

Second. Cholecystitis with large perforations and pericholecystic abscesses, so that on entering the abscess with the finger one at the same time enters the gall-bladder. But even here the procedure will depend upon the extent of the involvement and the condition of the patient.

Third. In cases of known hæmorrhagic tendency.

Fourth. In obviously moribund patients.

The advisability of the radical procedure during the actual progress of a typhoid fever would have to be considered after a review of the facts in the individual case. Even here gangrene would be an indication for cholecystectomy. The question has not yet arisen in any case since I began doing this work systematically.

^{*} At the present date (June 22, 1904) this patient has had no pain for nearly a year.

The operation has been greatly simplified by the employment of an operating table with an enamelled iron piece about six inches wide, which may be raised or lowered by means of a crank so as to serve instead of a sandbag or pad under the patient's back. This device permits one to hyperextend the patient to any desired degree of lordosis. The gain in accessibility is really most remarkable.

The steps of cholecystectomy as performed by the writer are as follows

First, an incision is made from two to four inches long running between the fibres of the upper portion of the right rectus muscle at about the junction of its inner and middle third. The posterior rectus sheath and peritoneum are now incised between mouse tooth forceps and digital exploration is made. The gall bladder having been located is drawn towards the external wound. If the viscus is very tense or is supposed to contain infectious fluid, it is isolated by gauze packings, and aspiration is performed in order to empty it as completely as possible. When the walls seem very friable, it is even wise to incise and empty the viscus, closing the opening by ligature or clamp before proceeding with the extirpation. The gall bladder is usually quite a tough organ, and in the majority of cases it may be grasped with an ovarian ring clamp applied near its fundus, which at the same time closes the aspiration puncture.

The patient is then placed in the proper position by raising the movable piece of the table for about six inches, gauze packings are laid over the neighboring viscera, and the parts are exposed with the help of blunt retractors. Traction upon the gall bladder is continued, and an incision with scissors is made through its peritoned covering at the fundus, about half an inch from its junction with the liver. One blade of the scissors is worked between the serious and fibrous costs of the viscus, and an incision parallel to its long axis is made first on its anterior and then on its posterior aspect. Usually some tough fibrous tissue has to be divided in order to free the fundus from the edge of the liver, then the viscus is further

freed with the finger, taking care not to lacerate hepatic tissue. Hæmorrhage is usually very slight and is easily controlled by packing. Near the cystic duct the connection between the gallbladder and the liver again becomes more intimate, and it may be necessary to divide fibrous tissue with the scissors, controlling an occasional little spurter with artery clamps. During this entire procedure traction is made by means of the ovarian clamp. When the cystic duct is reached, it is caught with a clamp, the jaws of which are at a right angle with the handles. Now with a hæmostatic needle a traction suture of silk or chromicized catgut is passed directly through the cystic duct about one-quarter or one-third of an inch beyond the clamp (i.e., between the clamp and the common duct). ends of this suture are tied together, but the suture itself is left free, so that if desired it may be withdrawn after the operation. In order to be prepared for possible accidents, I usually put in two of these sutures. The gall-bladder is now ablated between the clamp and the traction sutures after protecting any visible viscera with gauze. An assistant now makes traction by means of the sutures, raising the cystic duct towards the external wound. If the cystic duct is patent, bile will probably flow and the cystic artery or arteries will spurt. If there is no bleeding, traction on the sutures should be released until the vessel spurts. It is then caught and ligated. This done, the rest of the operation may proceed at leisure.

The cystic duct being now freed from its fibrous connection with the liver, traction upon the sutures will bring the common and hepatic ducts into view, and if the cystic is patent, a large probe may easily be passed under guidance of the eye in either direction. If the cystic is not patent, it is not wise to trust to palpation in determining the presence or absence of calculi in the other ducts, but the cystic should be slit with scissors down even into the common duct, if necessary, or until there is a free flow of bile. In the absence of stones, a large-headed probe may now be passed into the duodenum. Large stones in the common duct may be removed through a prolongation of this slit, and stones from the hepatic

may be brought to the opening by manipulation, or may even be removed through a separate incision into the hepatic duct Being now perfectly certain that the passages are free.

the incision, if there is one, into the common duct may be sutured, and the cystic, if not slit, may be ligated with chromicized catgut. The suture of the common duct may be so placed that the seam is at right angles to the long axis of the structure if there is any fear that a longitudinal seam might dangerously narrow the lumen. The seam in the stump of the cystic, however, should always run longitudinally, and the duct ligated as if it had not been sutured. It is my custom to leave the chromic gut lightnet long, and not to remove the traction sutures, but to permit all the ends to emerge at the abdominal wound. I have rarely found it necessary to sew over the raw surface of the liver, and then only as a hemostatic measure in persistent oozing.

It is now time to let down the table, and this should be done while the depths of the wound are thoroughly exposed, so that in the event of bleeding, on account of the release of tension as the patient comes into his more natural position, the points of harmorrhage may be instantly seen and secured

A slender cigarette drain is carried down to the stump of the cystic duct, and the peritoneum and fascial portions of the wound are closed with chromicized catgut sutures, the skin being approximated with sterile zince rubber plaster

The shock following this operation is not usually severe, but an elevation of temperature for the following two days is to be expected. Vomiting is not often troublesome. There is frequently a considerable amount of bihary discharge from the raw surface of the liver, necessitating a change of superficial gauze in two or three days. The drain may be changed in from six to eight days and replaced by a small rubber tube for five or six days longer. The stump, if large, comes away in from ten days to two weeks or even longer, but if the existe duct was not particularly thickened, its stump may never seen, the lighture of chromicized gut coming away alone. As soon as the stump or ligature is out, a thick pid, made by

TABULAR STATEMENT OF CASES OF CHOLECYSTECTOMY.

Remarks.	Attacks without jaundice. Postoperative hernia.	ខ្ល	Feels better than for years before operation.	Several attacks with jaundice, after operation. Well	tor the past year. Continued good health. Very thick-walled gall-bladder. Movable panereas. Patient well in two weeks.	Urcemic coma twenty-four hours after operation. No suture of abdomen. Hernia, but well.	Fostoperative stump abserss. Single large stone. Right-sided pneumonia. Reentrence of symptoms and passage of two large	Stolles, well now to learly a year. Complete rapid recovery. No leakage of bile. Stone in cystic duet.
.bsid.	:::	::	: :	::	:::	:	::::	::
Postoperative Pneumonia.	:::	::	: :	- :	:::	:	: : - :	::
lo vroisiH biodqvT	: H H	::	::	::	:::	:	: : : :	::
Pain.	: +	::	::	:	:::	:	::::	: :
chosony. chotomy. With Drainage Ducts.	1:::	::	::	: :	:::	:	::::	::
With Choledo-	: • :	::	::	::	:::	:	::::	н :
Jaundice.	:::	₩ :	::	- :	:::	н	-::+	нн
Gangrene.	: : :	⊢ :	::	- :	:::	'н :	H : H :	: :
Chronic.	:::	: H	٠:	: "	۲ : :	:	: - : :	: :
Acute.	ннн	н :	: =	+ :	: " "	H 1	H : H H	нн
Stones present.	ннн	нн	нн	нн	H : F	н	:	нн
Female.	ннн	٠:	: "	нн	ннн	H	: + + +	нн
Male.	:::	: +	۰ :	: :	:::	: '	- : : <u>:</u>	::
Age.	46 35 30	30	30	4 1	28.0	46	31 49 31	30
.elsiinit	M. N. B. F. J. S.	.х. г.	S. W.		II. S. F. P.	M. L.	S. S.	7. F.
	1900 1900 1901	1901	1902	1902	1902 1902 1902	1902	1902 1902 25, 1902 8, 1902	1902 1903
Date.	13,13	23,	, is,	25. 25.	4,∞, r,	î	20°,	ى ئى
	May Nov. Feb.	May July	Jan.	Feb.	Mar. Mar. April	June	Nov. Oet.	Dec.
Case Number.	нап	4ν	9 1/0	ο O	11 12	13	14 15 16 17	18

		PRIMARY	CH	OLEC	YSTEC	TOMY		
Emprena of gall bladder Appendicectomy for chronic appendicules at same sitting. Typhodo bacille in fluid of gall bladder, later in pen tones? Hing	Several attacks since operation No stones passed Appendix removed at same time	Appendirectomy at same siting Supportation of would, mild in character Single attack without jaunitore, time weeks after operation Well ever since	Stump closed by suture, not ligature Leaksge Pertonius	One attack of colic without jaundice Inflamed appendix removed at same time Gall bladder normal	Surepococeus cholecyshus Sepas Pregnant sur	Pencholecystute abscess Streptococci in pus	Actor was after operation and but blader and address to cape of large defect in dacedram. Duodemplasty at same operation Stenosis of syste duct.	
					,-			-
					-			10
-	**		34				-	80
	-			-				9
	-							"
		-						9
	ны						-	10 32 34 29 13 8 14
		,				-	-	95
		~		~			- n	27
		M M M M		-	m m %		-	23
			-	-			14	*
-	-		-	-			м "	32
-	-		-	м			·	2
5 5	8 %	# 50 E 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	250	64 분	8 5 4	88.48	38.85	-
y si	של	#WOH# E	:=	AZ	RE0	8008	E P	
_ ×	ຽົ	MASAN HAGSH	מטו	ÞH	wh≼	2574 2002	5× -	
13, 1903 J K 3r, 1903 M S.	26, 1903 J A U 28, 1903 C F	22222	25	22	222	5244	20, 1904 M P 12, 1904 M P 20, 1904 I E	
ę,	6.9	50000	7.0	5.5	3 1903 11, 1903 16, 1903	2, 1903 5, 1904 5, 1904 9, 1904	20, 1904 12, 1904 20, 1904	
3.5	5 85	- 2282 5	: =	50.00	256		# II 8	Totals
to Jan. 13, 1903 J K 431	2 E	4 Var. 1, 1903 S Var. 17, 1903 6 April 21, 1903 77 April 28, 1903 8 May 11, 1903	July 11, 1903	11 Sept. 30, 1903	NNO NNO	2 2 2 2 3 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5	io Jan. 20, 1904 A H J H Feb 12, 1904 M P 12 Feb 20, 1904 I E	To
8 =	21 12	+1001-00	P.R	= 22	27.70	0 1-00 0	0 - 1	

wrapping a wide muslin roller with gauze, is bandaged firmly across the patient's abdomen below the sinus so as to press its walls together. Complete healing is accomplished in about four weeks, but has been secured in so short a time as four-teen days. The average time in the hospital is about three weeks.

The entire forty-two cases are here presented in tabular form, together with the histories of the last twenty-seven. The more interesting as well as all of the unsuccessful of the other cases have been published in other papers by the writer, and in the Mount Sinai Hospital Reports.

CASE XVI.—No. 73,239. Suppurative Gangrenous Cholecystitis; Cholecystectomy; Cure.

Mrs. S. S., forty-nine years old, was admitted October 24, 1902. Her past history, with the exception of what was called "nervous dyspepsia" accompanied by heartburn and belching, was negative. Two weeks before admission she began to have cramps, with considerable abdominal distention. The symptoms became more and more aggravated; there was severe epigastric pain radiating into the back, requiring morphine. There had been no vomiting but considerable belching. Urination had been normal; bowels constipated. The epigastric pain, in the beginning of a cramp-like character, became continuous. There never had been jaundice nor chills.

On admission her general condition was found to be fair, the tongue clean. There were a few râles at the left base. The patient was very obese.

In the region of the gall-bladder a tender mass could be easily felt; it seemed to reach to the level of the umbilicus; it had a rounded border and moved with respiration. The abdomen was fairly lax. The entire right side was tender to pressure.

On the day after admission, under chloroform anæsthesia, she was operated upon by the writer. An incision was made about four and one-half inches long between the fibres of the upper portion of the right rectus muscle. An enlarged gall-bladder presented, covered in front over its greater part by a considerably enlarged liver and surrounded by loosely adherent omentum and colon. On attempting to free the gall-bladder from its attach-

ment to the under surface of the lwer, it suddenly burst, and considerable thick, purulent matter escaped. The viscus was now slit open and the mucosa wiped dry of pus and extirpation proceeded with. On account of the extraordinarily deep situation of the cystic duct, it was clamped and the instrument left in situ. The stump was cauterized with pure earbolic. Cigarette drain and partial layer suture of wound

The gall-bladder, examined after its removal, was found to be greatly thickened, there were numerous ulcerations and points of gangrene, but no calculi

A right-sided postoperative pneumonia somewhat delayed convalescence

Five days after operation the clamp was removed and discharge of bile from the wound began The biliary discharge ceased about November 15 and the patient was discharged well on December 3 thirty nine days after operation

CASE XVII -No 73373 Cholelithiasis, Common Duct Impacted Stone, Cholecystectomy, Recovery, Relapse

Mrs A S, aged thirty one years, had had numerous attacks of typical gall stone colic with jaundice. About six weeks before her admission on November 7, 1902, she had had an attack lasting from twelve to fourteen hours immediately followed by jaundice continued for fully two weeks. Two weeks before admission she had passed, following the attack, two gall stones almost as large as marbles, and since their three others were passed. She was first seen by me in consultation with Dr. L. Steeplitz.

On admission to the hospital there was considerable jaundice. The general physical examination was negative and nothing was palpable.

Operation was performed under gas and ether on November 8. The liver was found somewhat enlarged, and, projecting from its under surface and adherent to the transverse colon and stomach by firm adhesions, was the distended and elongated gall bladder. Two movable calcult, the size of small marbles, were distinctly felt within the common duct. These stones were forcibly dislogation to the gall bladder, where they were secured. Cholecy steetomy was now done in the usual manner, the ducts, however, being examined digitally, no probe being passed. The wound was closed by suture and strapping.

Her recovery was uneventful, and she left the hospital on December 5, about a month after the operation Note.—This patient has not remained well, but has had three or four attacks of typical biliary colic and has passed two more stones, the size of small marbles. That these stones were overlooked at the time of the operation seems hardly probable. It is not impossible, however, that this might have been the case, but the possibility of new stones having formed in the ducts cannot be excluded. This patient is the only one who has presented actual proof of recurrence of colic due to stones.

Case XVIII.—No. 73,578. Cholehthiasis; Common Duct Stone; Cholecystectomy; Choledochotomy with Suture; Recovery.

Mrs. D. F., thirty years of age, had her first attack of jaundice shortly after her first confinement, about four years before admission. She was seen in consultation with Dr. Kalisher.

Her present illness had been of eight months' duration, beginning with pain in the back, repeated vomiting of whitish material, but neither chill nor fever. A few days after the onset she had become jaundiced. Since then she had had one or two attacks each week. The jaundice had increased and diminished, but the patient's skin had never been of a normal color. For the past four weeks she had been continuously and deeply jaundiced and had suffered from itching of the skin. There had been considerable loss of weight, twenty to twenty-five pounds.

On admission, the liver in the right hypochondriac region extended well below the level of the umbilicus and into the flank.

On December 2, 1902, under nitrous oxide and ether, a four-inch incision between the fibres of the right rectus was made, the incision beginning about two inches above and extending about two inches below the navel. A short second incision at right angles to the first was made at the level of the umbilicus backward. Cholecystectomy was performed in the usual manner. The entire gall-bladder was found densely packed with stones, and more stones were worked into it from the cystic duct. Exploration of the common duct disclosed a large stone close to the duodenum and very slightly movable. After considerable manipulation, the gall-bladder having been removed, the duodenum was rotated upon its longitudinal axis until the ampulla presented between the duodenum and stomach. This was incised close to the intestine. A large gall-stone was removed after it had been previously crushed with forceps, and a gush of bile at once followed. The

longitudinal opening in the duct was closed with five or six interrupted stil, sutures, the seam being transverse. Small strips of gauze were placed on either side and over the line of suture. A cigarette drain was carried down to the stimp of the gall bladder and the greater part of the wound was closed by suture.

The gall bladder was found to be about five inches long, with its walls somewhat thickened, its mucosa was also much thickened and trabeculated. It contained numerous large, facetted stones. The cystic duct was nearly one half inch in diameter.

Recovery in this case was prompt, and the patient was discharged on January 12 entirely well. There had never been any leakage of bile

Note.—She has remained well up to the present time and has gained over thirty pounds in weight.

CASE XIX -No 73,777 Cholehthrasis, Stone in the Cystic Duct, Cholecystectomy, Recovery

R P, forty-six years of age, was admitted on the 27th of December, 1902, with a history of biliary colle for about twenty-eight years, during which time she had had about fifteen attacks. They lasted usually for a few hours and were quite characteristic, icteric phenomena invariably following. The longest period of freedom was four and one half years, but there had been a severe attack lasting two weeks about thirteen months before admission.

Her present history was of four weeks' duration. It began in the characteristic was, but deep jaundice came on and persisted. The liver was not palpable below the free border, but the region of the gall bladder was very tender on pressure. There was some fulness in the right flank, the abdomen was tympamitic. Temperature was 99° F. pulse, 90

On January 3 cholecystectomy was performed. There were some comental additisons to the fundus which had to be ligated A stone in the cystic duct was milked back into the gall bladder. The cystic duct was only about half an inch long and was much dilated. The common duct, also, was very short, and the stone was at the junction of the two. On removal, the gall bladder was found to be very short, its mucosa injected and thickened. It contained about ten facetited stones the size of peas and numerous very small ones.

Five days afterwards the wound was dressed and the drain changed, the following day the drains were removed. On the

thirteenth day the chromic ligature came away, and on February 4 the patient was discharged recovered.

CASE XX.—No. 73,922. Ulcerative Cholecystitis; Chronic Appendicitis; Cholecystectomy and Appendicectomy; Cure.

Mrs. J. K., aged forty-three years, had had numerous attacks of what had been regarded as appendicitis. The first attack had been about eight years before, and the average duration was two days. She had suffered from colitis for many years; never had had typhoid fever.

The present illness had begun about six weeks before with attacks of abdominal pain, worse on the right side and shooting into the shoulders. There had been neither vomiting nor jaundice. The pain recurred from six to eight times a day.

On January 13, 1903, there was a sharp chill with a temperature of 104° F.; constipation, rapid pulse, and positive Meltzer's sign. There was distinct resistance with tenderness in the right hypochondrium. The writer saw the patient then in consultation with Dr. S. J. Meltzer and concurred in the diagnosis of appendicitis with probable cholecystitis. The patient at once entered the hospital, where an immediate operation was performed.

An incision along the border of the right rectus was first made, and an adherent, chronically inflamed, and much thickened appendix removed. A tense and distended gall-bladder, bound down by many firm and organized ahesions, was then found on palpation through the wound. The incision was enlarged upward, making it about four inches in all, and the gall-bladder, after the aspiration of about four ounces of turbid green fluid, was extirpated in the usual way. The gall-ducts were hastily explored, but no calculi were found. The cystic duct was ligated with heavy chromic gut, the stump carbolized, and the wound closed with drainage down to the stump.

The gall-bladder was of about eight ounces capacity; its mucosa was much congested; there were numerous ecchymotic spots and small ulcerations. No cause for the cholecystitis was found.

Recovery was prompt, the patient being discharged well on February 8. For some weeks after discharge this patient had occasional attacks of an anginoid type, the pain shooting down the right arm. Her physician, Dr. S. V. Haas, considered these attacks neurotic in character, and this opinion seemed to be con-

firmed, since they subsided completely under appropriate treat ment

CASE XXI-No 74 068 Post typhoid Cholecystitis in a Child. Cholecystectomy, Cure

M S. a boy twelve years old, had been discharged from the hospital about three months before after a rather severe typhoid For about six weeks he was well, and then he had occasional sharp attacks of epigastric cramps There had been six attacks in all Pain had been very severe, causing him to cry out and double up The attacks lasted two or three days Sometimes they were accompanied by vomiting, at other times not, they were not influenced by ingestion of food. There had been neither jaundice, fever, nor chills

He was readmitted on January 31, 1903 with a liver palpable below the free border of the ribs and with an undefined, hard, rounded mass, very tender to palpation, in the region of the gallbladder There was considerable abdominal rigidity. The urine contained a trace of bile. His temperature on admission was 100 2° F, but it rapidly rose to 104° F, and operation was at once undertaken

A two inch incision through the fibres of the right rectus at its upper border exposed the edge of the liver, which almost hid an enlarged, tense gail-bladder. There were a few adhesions about the cystic duct. Aspiration yielded three ounces of fluid, at first clear and watery then thick pus The gall bladder was removed in the usual way, but a slight tear with escape of fluid occurred near the cystic duct, which was then ligated close to the choledochus The gall bladder was four inches long, the mucosa much thickened and congested There were no stones The wound was closed with layer suture and cigarette drain to the stump

A report on the fluid showed typhoid bacilli The patient reacted well, but on the following day the temperature rose to 101.4° F, respiration, 36 There was a distinct yellowish color to the skin, which was dry There was con siderable abdominal rigidity

The drain was removed, and it was found that leakage of ble had occurred, evidently through the accidental tear of the cystic duet, which had not been properly included in the ligature. The white blood count at this time was 30,000. On February 2,

forty-eight hours after cholecystectomy, the patient was once more anæsthetized, the wound reopened, adhesions freely broken up, and the space between colon and right kidney, which contained a considerable amount of purulent, bile-stained fluid, washed out. The wound was drained and packed. A culture of the fluid from the free peritoneal cavity showed the presence of typhoid bacilli.* The peritonitis gradually yielded, and on February 7 the ligature came away. On March 2 the patient was discharged well.

CASE XXII.—No. 74,301. Cholecystitis; Cholelithiasis; Common Duct Stone; Cholecystectomy; Choledochotomy; Recovery.

Mr. J. A. U., sixty years old, came to me on February 11, 1903. For ten years he had had attacks of "stomach trouble," paroxysms often coming on as frequently as once a week. He had never been jaundiced and vomited rarely.

The present attack had come on a month before, with jaundice gradually becoming more pronounced, until the icterus was as marked as I have ever seen it. There had been dull abdominal pain, never localized nor radiating. There had been neither vomiting nor headache, nor anything resembling biliary colic. He had lost considerable weight and strength. The diagnosis lay between carcinoma and chronic gall-stone obstruction.

On examination, a fairly firm, rounded mass, absolutely not tender, was made out about three fingers'-breadths below the right costal border. His physician, Dr. Manges, agreed with me that an exploratory operation was indicated, so Mr. U. was admitted to the hospital on February 24, 1903, and after careful preparation operation was undertaken on February 26.

Nitrous oxide and ether were the anæsthetics selected. The usual right rectus incision, about four inches in length, disclosed a contracted gall-bladder containing several stones and with many neighboring adhesions. The ducts were palpated and seemed to be empty. During this manipulation a small structure was found adherent to the common duct. It was at first considered to be a gland, but when removed it appeared as a hard, white, completely spherical mass about one-fourth inch in diameter. On section it had a thin, hard shell with pulpy contents. Dr. F. S. Mandle-

^{*}Cultures in this case were made by Dr. E. P. Bernstein of the Pathological Department.

baum, Pathologist, reported it to be a degenerated and calcified epiploical appendage. The gall bladder was now dissected out from the liver, rupture of the organ occurring during the procedure. The bile was sponged away, and eight rounded yet slightly facetted stones, each one fourth to one half inch in dameter, were removed. The bile began to flow so profusely that a temporary ligature was passed around the cystic duct to control it. The common duct was considerably thickened, so that palpa tion was not quite satisfactory, and accordingly two silk guide sutures were passed through this structure and the duct incised in its long axis. The probe passed readily into the duodenum. The duct was now sutured with silk, so that the seam ran trans versely to the long axis. Evisceration of the mucosa of the gall bladder was now attempted, but so much hemorrhage was en countered that complete extripation was considered safer, and was accordingly performed. The coats were tremendously thickened, the mucosa was very succulent and vascular. The wound was sutured, except the skin, which was closed by strapping, and the usual drain was carried down to the cystic duct.

At my first visit the following day I found my patient reading the newspaper His recovery was ideal and there never was the slightest leakage while he was in the hospital, but a sinus persisted long after his discharge, which took place on March 23 It finally closed, however, after a sudden profuse discharge of bile, and the patient has remained in perfect health

CASE XXIII—No 74 327 Cholecystuts, Cholelithiasis, Chronic Appendicitis, Cholecystectomy Choledochotomy with

Drainage, Appendicectomy, Recovery

Mrs C F, aged twenty nine years, patient of Dr M Rosenthal, had had typhoid when she was twelve years old For the four years before her admission to the hospital on February 27, 1903, she had had frequent attacks of typical biliary cole with pain, jaundice, fever, chills, vomiting, clay colored stools, and dark urine Two gall stones had been passed with stool seven months before The jaundice had never been persistent, and was most marked after a severe attack of pain. For the ten months previous to admission she had had attacks at very frequent in tervals. She had lost twelve pounds in weight, her appetite had been poor, bowels constipated

On examination her general condition was fair, tongue moist

and clean; slight subconjunctival icterus. The liver percussed one finger's-breadth below the costal border in the mammary line, otherwise it did not seem to be enlarged and was not palpable. No mass could be felt.

On February 28, under gas and ether anæsthesia, I operated through an incision two and one-half inches long between the fibres of the upper part of the right rectus. A small gall-bladder with very much dilated but short cystic duct was removed. It contained thick bile, some of which escaped on account of the tearing out of the clamp which held the viscus. The common duct was secured by two silk traction sutures and longitudinally incised for about half an inch below the junction of the cystic. A soft, pigmented stone was removed in fragments from the common duct, and a large-headed probe was then passed on into the duodenum. A tube was pushed into the common duct and was held in place by sutures passing through the duct, but not through the tube. This tube was inserted about one inch towards the liver into the hepatic duct.

The appendix had been previously found and marked with a ligature, which was left in the wound. It was now again drawn into the wound and appendicectomy performed. The wound was closed by suture and adhesive plaster, the tube in the duct being left long, so as to drain outside of the dressings.

The serosa of the gall-bladder was found much thickened; the mucosa pale and thick. The total length of the organ was about three inches. The appendix was five and one-half inches long, its lumen for the proximal, three and one-half inches, being obliterated, and its last two inches being represented by a tapering fibrous cord.

The tube was removed from the duct on March 6, and on the 25th the discharge ceased. Patient left the hospital on March 27, four weeks after the operation.

Note.—She has had several attacks of biliary disturbance with jaundice since the operation, and I have advised her to submit to another operation if a thorough trial of medical treatment should fail. Possibly an erosion due to the presence of the drainage tube resulted in a cicatricial stricture of the hepatic duct, and it is not unlikely that with the atrophy of the cicatrix the patient may be relieved. At any rate, the cholecystectomy can in no sense be blamed for the recurrence of symptoms, for a choledochotomy was in any event indicated.

CASE XXIV -No 74,343 Acute Cholecystus, Cholehtha sis, Cholecystectomy, Recovery

Mrs R F, thrity-two years old, a patient of Dr M Schiller, had suffered from a typical attack of gall colic three months before. The pain had been severe and was accompanied by vonuting and diarrhesa. Jaundice had appeared on the second day and had continued for forty-eight bours. About six weeks later she had had a sinular attack lasting only one day, and not accompanied by jaundice. There was another slight attack in two weeks, and then on February 25 the most severe attack of all had begun Every motion was painful. The patient was very constipated and vomiting was frequent. There had been chills and fever, the temperature rising to 105° F.

On examination a tender point was found in the right iliac region, but rigidity was most marked over the upper right rectus No tumor was felt, the patient having a thick panniculus, and being difficult to examine. There was no jaundice

The writer advised operation, which was accepted, and the patient entered the hospital on March 1, 1903. Under nitrous oxide and either anæsthesia an incision about five inches long between the fibres of the right rectus was made. The gall bladder was very deeply situated, it was congested and thickened, but there were no adhesions. The viscus was very tense. About three ounces of bile and pus were aspirated in order to relieve tension, and the gall-bladder was then easily peeled away from the liver. The viscus was now removed, the cysic duct being ligated separately, and the ducts thoroughly explored. Numerous small cholesterin stones were found in the gall bladder, which had contracted until it was only about three inches long, although it was very much larger when distended. Its walls were very thick, the nucosa congested and trabeculated, but there were no infectations nor gangrene.

On March 6 the drain was removed and a tube inserted Recovery was ideal, the patient being discharged well on March 22, three weeks after operation

Note — The patient has remained free from biliary disease

CASE XXV — Cholecystitis, Cholelithiasis; Cholecystectomy,
Recovery

A S, twenty-five years old, was admitted on the 14th of March, 1903, with a history of attacks of biliary colic dating from

three months before. The diagnosis of cholelithiasis had been made, but in spite of careful search no stones had ever been discovered in the stools.

The attack for which he sought relief on admission had been of seven days' duration, coming on immediately after a light meal, with cramp-like epigastric pains radiating towards the lower right costal border. There had been vomiting, but neither chill nor fever. Constipation, but no jaundice.

When I first saw him his general physical condition was good; temperature 100° F.; pulse not accelerated. There was rigidity of the upper part of the right rectus with tenderness on percussion. The liver was palpable one finger's-breadth below the ribs.

On March 17, under ether anæsthesia, cholecystectomy was performed through a four-inch incision through its rectus. The gall-bladder was readily dissected from its peritoneal hepatic attachment. It was very tense, fully six inches in length, and its walls were much thickened. A large calculus was felt in the cystic duct and forced back into the gall-bladder. After digital exploration of the hepatic and common ducts, the cystic was ligated, the gall-bladder cut away, and the stump carbolized. The wound was closed by suture of deeper tissues and strapping of the skin, a small cigarette drain being carried down to the stump.

On opening the gall-bladder it was noted that the mucosa was covered with many small ulcers, and that the viscus contained eight calculi from one-quarter to two-thirds of an inch in diameter, as well as a multitude of small ones. On March 21 the wound was dressed and the drain replaced by a small tube. There had been a slight bronchopneumonia from which the patient was convalescent. On April 4 he was out of bed, and on the 8th, twenty-two days after operation, he left the hospital, the wound entirely healed. He remains perfectly well at the present writing.

CASE XXVI.—No. 74,786. Cholelithiasis; Appendicitis; Cholecystectomy; Appendicectomy; Recovery.

S. G., twenty-one years old, was admitted April 19, 1903. She had been discharged from this hospital two weeks before, the diagnosis of cholecystitis having been made and operation having been refused. The biliary colic and fever having returned, she again sought relief, this time accepting operation.

On admission her temperature was 101° F.; pulse, 112.

There was acute tenderness in the region of the gall bladder, but no mass was palpable, in spite of the fact that her abdomen was lax Considerable tenderness in the right iliae region made the diagnosis of appendictis also probable

On April 21, under nurous oxide and ether followed by chloroform, I performed cholecystectomy by the usual method The case was a very simple one and it is not necessary to go into it in detail. The common duct was free A separate incision through the right rectus in the thac region was now made and the appendix removed.

The gall bladder was five inches long, its walls not particularly thickened. It contained forty three facetted stones of various sizes. The appendix showed evidences of chronic inflammation.

Four days after the operation the small drain was removed and replaced by gauze The patient was discharged well on the 13th of May, twenty two days after operation

Case XXVII -No 74 844 Acute Ulcerative Cholecystitis,

Cholehthiasis, Cholecystectomy, Recovery

A T, aged sixty eight years, came to the hospital on the agth of April, 1903. His past history bore no direct relation to his disease, which had begun three days before with lancinating pain in the lower right chest, much increased by the motions of respiration. There had been no cough and no chill, but some fever. Considerable nausea. There was constipation, but no jaundice.

His general condition was quite good, but there was some pulmonary emphysema. There was great tenderness over the entire right upper quadrant of the abdomen. The free border of the liver could be distinctly palpated at the level of the umbilicus and the gall bladder quite well made out. Rigidity of the right upper quadrant was marked.

This patient was considerably prostrated, his temperature being 1036° F, pulse, 120, respirations, 32. Although there was marked tympanites, it was not considered that signs of peritonitis were present

After three days of general treatment operation was undertaken in chloroform anæsthesia. An incision four inches in length was made in the usual location, the liver was found within two inches of the umbilious, congested and "nutmeg" in appearance. The gall bladder was large apparently thickened, the cystic duct very much dilated and containing a large calculus. Firm adhesions to the colon and gastrohepatic omentum caused considerable technical difficulty, nearly all of the adhesions requiring ligation. The anæsthesia had been accompanied by considerable cyanosis and the operation had to be hurried. The gall-bladder was removed after ligation of the cystic duct. It was four inches long; its walls near the cystic duct being fully half an inch thick, while near the fundus they were only one-eighth of an inch in thickness. The mucosa was thickened, trabeculated, and near the duct there was a superficial ulceration. Many fragments of a large, soft stone, and innumerable small, brownish-yellow stones, together with several ounces of dark, viscid fluid, almost fæcal in appearance, were contained within the viscus.

Recovery in this case was quite slow on account of an intercurrent pneumonia and some suppuration in the depths of the wound. He was, however, discharged entirely well on June 10.

CASE XXVIII.—No. 75,405. Cholecystitis; Stones in Common Duct and in Gall-bladder; Cholecystectomy; Choledochotomy.

This patient, Mrs. A. W., was sent to me by Dr. Henry Heiman on April 19, 1903, with a history of typical attacks of biliary colic followed by jaundice, extending over a considerable number of years. She was thirty-four years old, well nourished but not obese, and in excellent general condition. Examination was absolutely negative, and operation was advised solely on the evidence of the history.

On May 10 she entered the hospital and was operated upon the following day. A three-inch incision between the fibres of the right rectus revealed a shrunken, firmly adherent gall-bladder with many stones. The organ was divided into two chambers by a firm cicatricial septum or stricture. The fundus was filled with mucopus, but contained no stones. The other chamber of the organ contained numerous facetted stones, and on palpation a very much dilated common duct, containing many small calculi, was made out. The gall-bladder was removed in the usual way. Two retracting sutures were passed into the common duct and an incision was made between them. There was a free discharge of bile and six stones were removed from the duct, one of which had to be crushed and extracted in fragments. A probe was now passed into the hepatic duct and down into the duodenum. The

common duct was sutured with chromic catgut, so that the seam ran transversely, and the stump of the cystic ligated. The gall-bladder near its fundus had been so intimately connected with the liver that parts of the mucous membrane were left, and these were now destroyed with the actual cautery. Peritoneum and fascia were closed by suture and the skin strapped, the retracting sutures in the common duct being left long.

The gall bladder proved to be one and one-half inches long, of an hour glass shape, its walls very thick and friable. There were no ulcerations, but the mucosa was thickened and cedematous. There were twenty four small, irregular gall stones.

On May 20, nine days after operation the wound was found healed with the exception of the dramage opening. On the 31st of May the patient was discharged with a small sinus, which closed a few days afterwards.

Note—In spite of the thoroughness of this operation, the patient had a severe attack of colic about ten days after her discharge. There was no jaundice, however, and Dr. Heiman reports that there has been no other attack, the patient remaining in perfect health.

CASE XXIX—No 75,058 Cholecystris, Cholelithiasis, Cholecystectomy, Recovery

B H, fifty eight years old, was admitted on the 16th of May, 1903 For thirty three years there had been attacks of bihary colic with occasional jaundice but neither chills, fever, nor vomiting She had had rheumatism but not typhod For two weeks before admission there had been nausea, with sensations of pressure in the epigastrium, culminating in an attack of colic. The pain recurred, and fever, with a temperature of 102° F, supervened

On admission a very large mass could be palpated in the region of the gall bladder which was extremely tender and farmly elastic. Her temperature was 103° F, pulse, 90

Immediate operation was performed through a four-inch tight rectus incision curving slightly inward in its upper portion. There were no adhesions but the gall bladder was found, the size of an orange, very much distended and extremely tense. Eight ounces of greenish bilary fluid mixed with pus were withdrawn by aspiration. The gall bladder was now packed off, its fundus incised and a number of medium sized tetrahedral stones were

removed. The cystic duct was S-shaped, very much dilated, and its walls were soft and succulent. It contained a number of stones. The common duct was very short and very wide. A clamp was applied to the cystic, a ligature placed below, and the gall-bladder cut away. A double-barrelled lumen was noted on examining the stump, further examination showing that this was due to the peculiar curve of the cystic duct. Careful exploration rendered it certain that the common duct had not been implicated in the ligature. The mucous membrane was carbolized and the wound closed with drainage to the stump.

The walls of the gall-bladder were not much thickened, but there were numerous spots of gangrene in the mucosa. The pathological report on the fluid taken from the gall-bladder was negative. (Examined by Dr. Bernstein.)

Convalescence was absolutely uneventful, and the patient was discharged on June 10.

CASE XXX.—No. 75,527. Cholelithiasis; Cholecystectomy; Recovery.

S. H., thirty-five years old, was seen by the writer for Dr. I. Strauss early in July, 1903. He had had typhoid fever when he was about thirteen years old and a severe attack of acute articular rheumatism in May, 1900. Seven months before his readmission on July 8 there had been a typical attack of biliary colic without jaundice, the attack continuing for three or four days. Four months later there had been a more severe attack accompanied by jaundice, clay-colored stools, and dark urine. The patient said that he had noticed "sand" in his movements. There had been a succession of colicky attacks for three weeks.

When first seen, in spite of the fact that the patient was quite corpulent, an extremely sensitive distended gall-bladder could be plainly palpated. Temperature about 100° F.; pulse, 84.

On the 11th of July cholecystectomy was performed through a four-inch incision. About twenty stones were milked from the common duct into the gall-bladder. After its removal, the viscus was found to be four inches long and of considerable bulk. The walls were markedly thickened. In addition to a number of smaller stones, one the size of a walnut was found.

In this case no ligature was placed around the cystic duct, but it was closed off by catgut sutures placed so as to bring the serous surfaces together. The wound was closed with drainage to the stump.

Two days after operation the temperature shot up to 1041/s° F, pulse, 140, with occasional vomiting. The dressing was stained with bile and the lower part of the abdomen somewhat swollen and tense. A bile peritonius was evidently present and a rubber drainage tube was inserted.

Two days later the temperature had fallen to 101° F and the pulse to 100, there was considerable scropurulent, ble stained discharge. The patient then made a good recovery, and was discharged on August 22

CASE XXXI -No 76,346 Cholehthiasis, Cholecystitis,

Cholecystectomy, Recovery

U D, forty eight years old, a patient of Dr Bodenheimer, had had frequent attacks of bihary colic. He had been suffering from indigestion and flatulence, but had never been jaundiced. There was no history of typhoid. For a few days before admission he had had very frequent attacks of bihary colic, and a minute gall stone had been discovered in the stools on careful straining through gauze. His general condition was excellent, with the exception of a nervous disorder characterized by tremor

Cholecystectomy was performed on September 30, 1903, under gas and ether anasthesia. In order to make sure of the patency of the cystic duct, of which there was some doubt, the gall bladder was shit down to this structure and it was thoroughly explored. Numerous small stones and considerable dark green fluid were found. The cystic duct was tied off with chromic cat gut and the wound closed with drainage to the stump.

The gall bladder was but slightly enlarged, its mucous mem brane was considerably injected and thickened. It was filled with an enormous number of small, irregular calcult. The pathologist's report on cultures from the gall bladder contents showed the presence of an actively motile bacillus negative to Gram, but not identified. (E. Libman, Assistant Pathologist's)

Healing was uneventful, the ligature coming away ten days after operation. Twenty five days after operation the patient was discharged well

CASE XXXII -No 76534 Subacute Appendicutes, Cholecystectomy, Appendicectomy

T M, thirty-four years old, was admitted on the 21st of October, 1903 She was single and a domestic

Her past history threw no light upon the illness for which

she had come to the hospital. This trouble began on October 13, with persistent vomiting and pain in the epigastrium and back. With slight intermissions the pain and vomiting continued until admission. Her temperature had been just over 100° F. There had been neither chills, sweating, nor jaundice. She was sent in by Dr. L. Stieglitz, with a diagnosis of appendicitis. On admission the abdomen was lax, all colic had disappeared, and there was absolutely no tenderness anywhere. There was a trace of bile in the urine.

On October 27 cholecystectomy was performed through a one and one-half inch incision between the fibres of the rectus. The liver presented and the gall-bladder was readily delivered. It was small and apparently normal, as were also the ducts. Cholecystectomy was easily performed, and the wound closed with a small drain to the stump.

This operation was decided upon at the time of the exploratory laparotomy mainly on account of the history and because the patient had stated that her mother had suffered for many years from gall-stones. The writer, not being satisfied that the symptoms had been due to trouble with the gall-bladder, made another one and one-half inch incision over the region of the appendix, and, much to his chagrin, found a well-marked chronic appendicitis with adhesions between the tip of the appendix and the cæcum of such a nature as constituted a typical jug-handle appendix. The organ was removed, the stump cauterized with pure carbolic, and the opening into the cæcum, where the tip of the appendix had been adherent, was closed by suture.

Recovery was uneventful, and the patient was discharged on November 10.

Case XXXIII.—No. 76,558. Cholecystitis; Cholelithiasis; Cholecystectomy; Recovery.

S. R., aged twenty-eight years, was admitted on the 2d of November, 1903. She had had typhoid fever thirteen years before. Otherwise her previous history was negative. The present history had been of nine months' duration, attacks of colicky pain in the right hypochondrium having become more and more frequent, until for a few weeks before admission they had occurred every five or six days. Pain had been exceedingly severe, radiating towards the back, accompanied by nausea and vomiting, with chilly sensations, and followed by weakness and profuse perspira-

tion There had been no jaundice The last attack, one week before admission, had continued for twenty-four hours

Her general condition was good, the skin having a slight, general icteroid hue. The liver was somewhat enlarged, and pressure over any part of this organ caused pain in the region of the gall bladder, which was distinctly palpable, projecting below the edge of the liver and quite superficial. The temperature was 99° F, pulse rate, 72

On November 3, under nitrous oxide and ether anæsthesia, I operated through a two inch incision in the right hypochon drum between the fibres of the rectus. The enlarged liver and somewhat dilated gall bladder presented. It was necessary to break up or ligate a moderate number of adhesions. The cystic duct having been exposed, retraction sutures were passed through its walls and the gall bladder cut away. The cystic artery was secured by separate ligature. The ducts were explored with a probe. The cystic duct was then ligated, the stump carbolized, and the wound closed with drainage by the eigarette method.

The very much thickened gall bladder contained about two ounces of mucoid material and thirty four calculi, varying in size from sand to a small marble. The mucosa showed old hæmor

rhagic spots

On November 8, after a smart reaction, the temperature rising to 103° F and the pulse to 108, the first dressing was done Primary union was noted, and the drain replaced by a very small tube. On the 22d of November, nineteen days after operation, the patient was discharged recovered.

CASE XXXIV -No 73,246 Cholehthusis, Cholecystec

tomy, Recovery

E H, single, nineteen years old, was admitted to the medical service on October 26, 1902, having been sick for ten days. Her illness was characterized by frequent attacks of cramp like epi gastice pain winnfluenced by eating. There had been rather frequent vomiting, at first of food, then of watery, bile-stained fluid. There had been neither fever nor chills.

On examination she was noted to be slightly intering. There was considerable tenderness in the epigastrium, especially in the median line, about two inches above the umbilitious. The blood count showed good leucocytes and a normal number of red blood-cells. The liver was palpable, and there was some tenderness on percussion over the remon of the earli-bladder.

On November 2 there was an attack of gall-stone colic, the blood and urine containing bile, and the stools being clay colored.

On November II she was transferred to the second surgical division for operation. Temperature at this time was 99½° F.; pulse, 82; respirations, 20. Operation was performed in gas and ether anæsthesia followed by chloroform, the usual technique being employed. Incision was two inches long. The omentum was firmly adherent to the entire lower surface of the gall-bladder and had to be freed from it by chain ligatures and section.

The gall-bladder was sausage-shaped, its walls very much thickened, and it contained ulcerations at the fundus. There were one large stone and seventy-nine small facetted ones. Wound was closed with drainage to the stump.

Six days after operation the first dressing was done, the drain removed and replaced by a small tube. The following day the temperature rose to 102.6° F., due to slight suppuration. The ligature and stump came away on the thirteenth day. Suppuration occurred beneath the aponeurosis, and a small counter-incision had to be made on December 20, after which recovery was rapid, and the patient was discharged cured on the 3d of January.

CASE XXXV.—No. 76,767. Post-typhoid Streptococcus Suppurative Cholecystitis; Pregnancy; Cholecystectomy; Death.

A. S., twenty-four years old, married, was admitted on November 15, 1903. She had had typhoid fever, for which she had been treated at this hospital in the fall of 1902 and the spring of 1903. During this time there had been evidences of typhoid cholecystitis.

Her present illness had begun about three weeks before admission, with severe pain in the right hypochondrium radiating to the back. The pain recurred in paroxysms, and she had vomited frequently. There had been jaundice since the outset. Bowels had been moved by cathartics.

On admission her general condition was poor; temperature, 97.4° F.; pulse, 92. She was pregnant, the uterus extending well above the umbilicus.

On November 16 cholecystectomy through a four and onehalf inch incision was performed in nitrous oxide gas and ether anæsthesia, for acute empyema of the gall-bladder.

On opening the peritoneum the gall-bladder was found surrounded by several adhesions, which were easily peeled off without

ligature The gall bladder, however, was very firmly adherent to the under surface of the liver and had to be cut away with scissors During the manipulation, a rent was made through its wall and about three ounces of yellow, foul smelling pus evacuated The operation was then completed in the usual manner

The gall-bladder after its removal was found to be three inches long and its walls considerably thickened. There were no ulcerations The peritoneum was congested, there were no stones

A culture from the pus, reported upon by Dr Libman of the pathological laboratory, showed the presence of streptococci

The patient did fairly well for the first twenty four hours Examination of the blood gave Widal reaction one to twenty Neither the bile nor the urine reacted to the Widal test (Libman)

About the third day after the operation it became evident that the sepsis had not been checked, and from this time on there was a hard fight against the general streptococcamia with pneumonia, and many of the other complications of this dreadful disease The blood culture, which was taken on the 30th of November, was, however, negative

After a terrible struggle with temperatures running from 97° F to 106° F, often in less than twenty four hours, the patient succumbed on December 8, twenty three days after the operation

A wound examination by Dr Bernstein sixteen hours after death showed hypostatic congestion of the lungs with miliary abscesses, the heart fatty and anæmic, the spleen septic, and the kidneys showing parenchymatous degeneration. An abscess, the size of a walnut, well closed off from the general peritoneal cavity, was found connecting with the lower angle of the wound The liver showed pershepatitis Between the under surface of the left lobe and the upper surface of the stomach was a large abscess containing about four ounces of pus. The liver paren-chyma was pale and acutely degenerated. On the upper surface of the left lobe were several abscesses from the size of a pea to that of a walnut The bile ducts involved in a necrotic granular mass could not be dissected

CASE XXXVI -No 76,928 Cholelithiasis, Gangrenous Cholecystitis, Suppurative Pericholecystitis, Cholecystectomy, Recovery

Mrs. R. B., fifty years old, was admitted on December 4, 1903. There had been repeated attacks of severe pain in the epigastrium and below the right ribs for four years, the pain radiating to the back and interscapular region. There had never been jaundice nor fever.

Her present attack had come on several days before with vomiting, constipation, and fever. There was no jaundice. The patient's general condition was wretched. Her temperature was about 100° F.; pulse, 102, and of very poor quality. There was considerable abdominal distention, and an extremely tender mass was palpable below the free border of the right hypochondrium.

Operation was performed the same day through an incision six inches long between the fibres of the right rectus muscle. A mass of adhesions presented. These were carefully separated after packing off the free peritoneal cavity and a considerable abscess was encountered and emptied. The gall-bladder was then seen to be markedly distended and distinctly gangrenous. It was at once aspirated and twelve ounces of dark hæmorrhagic fluid withdrawn. A few stones in the cystic duct were milked back into the gall-bladder. The viscus was then removed and careful exploration of the common and hepatic ducts performed, after which the cystic was ligated and the wound closed with drainage to the stump.

After its removal the gall-bladder was found to be four inches long and two and one-half inches in diameter. Its mucosa in many places was rough and gangrenous, many spots of gangrene passing through to the peritoneum. It contained a large number of yellow stones, varying in size from a mustard seed to a filbert. None of them were markedly facetted. The pathologist's report on a culture from the fluid showed the presence of streptococci. (Bernstein.)

Five days later the wound was dressed for the first time and was found in excellent condition. There was rather a profuse bile-stained discharge. On the 2d of January, 1904, she was discharged recovered.

CASE XXXVII.—Cholecystitis; Cholelithiasis; Cholecystectomy; Recovery.

Mrs. K. G., twenty-nine years old, had been sick for three and one-half years with the typical symptoms of biliary colic. She had lost thirty pounds during the past two years. She

entered the hospital on December 29, 1903, in a rather mild attack accompanied by jaundice. She had been referred to me by Dr T T Gaunt

The liver was palpable at the free border, the gall bladder could not be felt

On January 2, 1904 cholecystectomy was performed for stones. There were a few adhesions around the gall bladder, but the ducts were free

On its removal the gall bladder was found thickened, the mucosa hamorrhagic, and there were four stones from one half to one inch in diameter

This patient had several attacks of colic during her convalescence, but without jaundice. They gradually disappeared, and she was discharged well on the 22d of January, twenty days after operation. She remains well at the present writing *

CASE XXXVIII - Cholehthasis, Cholecystectomy, Chole dochotomy, Recovery

Mrs L G, aged forty four years, was admitted on the 1st of lanuary. 1004

For the previous four years she had had innumerable attacks of bilary colic with chilly sensations and jaundice. The attacks usually lasted three to four days and then most of the symptoms subsided. The jaundice had not disappeared after the last attack, which was several weeks before admission and the patient had lost considerable weight and strength. The itching was very severe, there was no fever

A large Riedel's lobe could be made out on the right side, the left lobe could be plainly felt below the free border of the ribs On inspiration, there was a point of tenderness just to the right of the umbificus

On January 5 operation was performed The gall bladder was found embedded in Ricdel's lobe there were numerous adhesions to surrounding structures. Stones were present in all three ducts and the common duct had to be incised.

The gall bladder on removal was found greatly thickened, there were several stones, two large ones being respectively onehalf and three quarters of an inch in diameter

She was discharged after an uneventful convalescence, the

^{*}June, 1904 Patient complains of 'indigestion' with pain after eating meat and with considerable belching

wound healing to a very short sinus twenty-four days after operation.

CASE XXXIX.—Cholelithiasis; Stones in Cystic and Common Ducts; Cholecystectomy; Choledochotomy; Drainage; Cure.

Mrs. A. R., patient of Dr. W. M. Brickner, was admitted to the hospital on the 8th of January, 1904. She was thirty-nine years old. Her mother had died of "gall-stones."

Nine years before admission she had had recurrent attacks of colicky pain which had become more and more frequent. The colic had usually lasted from four to six hours, and there had been vomiting, nausea, jaundice, and itching of the skin. There had never been fever nor chills. The jaundice had usually disappeared in about fourteen days. Between attacks the patient said that she felt perfectly well.

On examination the gall-bladder was not palpable, but operation was decided upon because of the history. It was performed on January 9 under gas and ether.

Riedel's lobe extended to the level of the umbilicus; the left lobe of the liver was also enlarged, and the gall-bladder surrounded by adhesions. There were stones in the cystic and common ducts but none in the gall-bladder. The common duct had to be incised for a considerable distance in order to remove a large, soft, friable stone. Because of the character of this stone and because I feared that some of the fragments had slipped into the hepatic duct, I decided to drain the hepatic. This was done by tube, the remainder of the incision in the common duct being closed by suture.

Convalescence was uneventful, and the patient was discharged on January 29, 1904.

CASE XL.—Acute Gangrenous Cholecystitis; Cholelithiasis; Cholecystectomy; Cure.

Mrs. A. H. P., thirty-five years old, had always suffered from "stomach trouble." Her first attack had come on about fourteen years before. She had never been jaundiced, but had had attacks every few months. About twelve years before there was a very severe illness with pain in the right hypochondrium.

Her present illness had begun on January 16 with nausea, vomiting, and epigastric pain shooting to the back and arms. Four days later there had developed a distinct tumor in the right hypochondrium with decided general icterus. There was great weakness. I then saw her at the request of her physician, Dr.

Follen Cabot Operation was proposed and accepted, and she entered the hospital on January 20

The usual operation was performed, a large, tense gall bladder being encountered Ten ounces of dark brown, thin fluid were removed by aspiration Numerous stones were felt within the viscus, the ducts were free

The gall bladder after removal was six inches long, its walls one half inch thick, covered with ulcerations and with numerous points of gangrene There were 268 stones from the size of a small shot to that of an almond

The pathological report on the fluid from the gall bladder showed staphylococcus aureus

The first four days after operation the nausea and vomiting were unchecked, but there was no sign of peritonius. The urine contained acetone in considerable quantity and diacetic acid. During this period the temperature did not reach higher than 1014. F, but the pulse was extremely rapid, of very poor quality, and the patient's condition seemed precarious. For three days sike did not sleep at all, and then at the suggestion of Dr. Manges who was asked to see her by Dr. Cabot, she received by rectum twenty grains of veronal, after which she slept, and from this time her convalescence was uneventful. She was discharged on February 9, twenty days after operation.

CASE XII — Obliterating Cholecystitis, Adhesion to the Walls of a Defect in the Duodenum, Cholecystectomy and Duodenoblasty, Recovery

M P, thirty five years old, was admitted to the service of Dr Manges on January 12, 1904. He had begun thirteen months before to suffer cramp like pain in his abdomen after eating. There had been one attack of Jaundice. The pain had been most severe at the pit of the stomach, with radiation into the back, and shoulder. It was relieved by somiting. The patient had lost weight steadily, and there was slight cough with mucopurulent expectoration. Blood had never been noted in the stools nor in the vomiting material.

On examination an area of tenderness was found in the left epigastric region, but there was no rigidity. The stomach was not enlarged to percussion. There was no tenderness in the region of the gall bladder. On inflation the stomach showed no enlargement below the umbilicus. The blood was examined for bile, but none found. The urine was clear, amber, sp. gr. 1012, daily

amount fifty-five ounces. A faint trace of albumen was present, with 1.5 per cent. urea and numerous hyaline and granular casts. Repeated examinations of the gastric contents had demonstrated the presence of a sufficient amount of free hydrochloric acid. The weight of the patient on admission was 125½ pounds, and a month later, in spite of treatment, it had fallen to 107½ pounds. His weight in health was said to be 160 pounds.

The working diagnosis of ulcer of the duodenum made by Dr. Manges gave with the history of the case sufficient reason for advising an exploration.

On February 12, under gas and ether anæsthesia, the right rectus incision was made for the purpose of exploring the pylorus. A hard, massive adhesion was at once encountered. It was the size of a large man's thumb and was evidently solid. It was firmly adherent to the pyloric region, and on peeling it away a defect in the wall of the first portion of the duodenum was disclosed. This defect was as large as the thumb-nail, and was not made by the peeling away of the adhesion, which was perfectly smooth and had evidently grown fast to the edges of the intestinal opening. The adhesion was now closely examined and proved to be a small gall-bladder with enormously thickened walls. Possibly a calculus had ulcerated into the bowel months before at this point. The defect in the duodenum was closed with silk sutures after digital exploration had shown the pylorus to be normally patent. The gall-bladder was now extirpated in the usual manner, and the abdomen closed with a single drain to the stump. The walls of the gall-bladder were about half an inch in thickness, and the lumen, completely obliterated at some points, admitted a fine probe at others.

Convalescence was uneventful. For seven days after the operation feeding was exclusively by rectum. Then gradually liquid nourishment was given by mouth, and ten days after operation solid food was first given. The patient was discharged March 7.

CASE XLII.—No. 77,577. Chronic Cholecystitis; Stenosis of Cystic Duct; Cholecystectomy; Convalescent.

Mrs. I. E., fifty-six years old, was admitted February 18, 1904. She had had typhoid fever twenty-six years before. During the six years before admission she had suffered about sixteen times with typical biliary colic and had been jaundiced twice.

Gradually the pain, while not extremely severe, became quite constant

On physical examination the patient stated that there was a tender point one and one half inches above and to the right of the navel The liver was clearly palpable below the free costal border

February 20, cholecy stectomy by the usual method The gall bladder contained no calculi, and seemed quite normal in appearance, but the cystic duct was so small that only the finest probe would pass. It was slit open almost to its junction with the common duct, and a large headed probe passed upward into the bepatic and downward through the common into the intestine Wound closed after a free escape of bile had been noted. Cigarette drain to stumb

Eight days after operation patient was doing well, only a narrow sinus remaining *

Concluding Remarks -1 Cholecystectomy, while not absolutely insuring a cure of cholelithiasis, is the most radical procedure at our command

- 2 The primary operation is far safer than the secondary
- 3 Judging by my own experience in a sufficient number of cases to warrant an opinion, I believe that primary cholecystectomy is, on the whole, an operation at least as safe as appendicectomy
- 4 The operation by the method here described is neat, accurate, and thorough

REFERENCES

- 'Encyklopadie der gesamten Chrurgie
- Die Pathogenese, Diagnose und Behandlung des Gallensteinleidens 1903 I Journal of the American Medical Association December 14, 1901
- 'Anleitung zur Erlernung der Diagnostik der einzelnen Formen der
 - Gallensteinkrankheit Journal of the American Medical Association December 1, 1001
- Medical News, May 2, 1903
- ANNALS OF SURGERY, 1902
- Loc. et, p 75
- " Medical News May 2, 1903
- " Medical Record February 21 1903 " Medical Record, May 31, 1902

^{*} June 1904 Patient made an ideal recovery, and was discharged early in March

PRIMARY SARCOMA OF THE SPLEEN, AND ITS TREATMENT BY SPLENECTOMY.

BY WILLIAM JEPSON, M.D., F.R.C.S. (ED.),

OF SIOUX CITY, IOWA,

Professor of Surgery in the State University of Iowa,

AND

FREDERICK ALBERT, M.S., M.D.,

Professor of Pathology, State University of Iowa.

Believing that the advancement in any field of science must result largely from the accumulated experience of the workers in that field, leads us to present the clinical history and pathological findings of a case of fibrosarcoma of the spleen.

Miss O. S., of Kenross, Iowa, entered the University Hospital, May 13, 1903, at the request of her physician, Clarence C. Heald, giving the following history: Age, fifteen years; her family history, as well as her past history, was negative so far as having any bearing upon her present condition. She had never suffered from malaria, any septic process or any injury, that she had any knowledge of. In fact, she had considered herself well until the early manifestations of her present trouble, which consisted in the appearance, about five months previous, of an enlargement in the left hypochondriac region, particularly noticeable upon standing or lying upon her right side. The growth had been gradually increasing in size. It caused her no particular discomfort, aside from a slight dragging sensation after walking about for some time, and the knowledge that there was something wrong as manifested by the presence of the mass which she could feel in the abdomen.

Her general appearance was that of a person possessed of good health and well nourished. Physical examination of the various organs of the economy gave no evidence of the existence of any abnormality, excepting the spleen, which was in question.

cigarette drain was introduced, which was removed on the second day.

Recovery uneventful. She left the hospital on the twenty-fourth day.

Present Condition.—On December 22, 1903, upon request, she presented herself at the hospital and the case was carefully gone over. Her general appearance was that of a person in good health. She expressed herself as having been in perfect health since her return home. Menstruation has been normal the past five months.

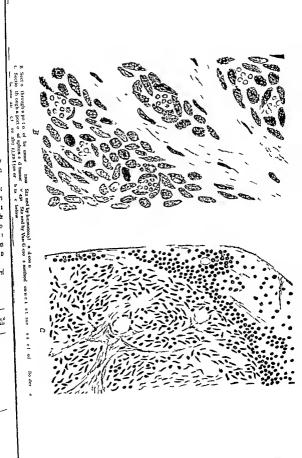
Examination of the various organs was negative. Abdomen palpable without pain or undue rigidity. The region occupied by the spleen, as well as the contiguous structures, were free from induration, the liver seemingly normal.

Blood Examination.—A blood examination was made two days prior to the operation and at intervals of two to three days following the operation. The patient was quite anæmic and had a moderate leucocytosis before operation. After the operation, the red corpuscle count fell for several days, then gradually the number increased. A marked leucocytosis was present immediately after the operation, which continued as long as the examinations were made. The amount of hæmoglobin varied in proportion to the number of red corpuscles.

Some poikilocytes, microcytes, macrocytes, and nucleated red corpuscles appeared, especially after the operation.

BLOOD	EXAMINATIONS.

Time of Examination.	Number of Red Corpuscles per Centimetre.	Number of White Corpuscles.	Per Cent. of Hæmoglobin
Two days before operation One day after operation Three days after operation Five days after operation Nine days after operation Thirteen days after operation Seventeen days after operation Twenty-one days after operation Twenty-four days after operation December 22, 1903, the seventh month after	3,320,000 3,810,000 4,360,000 4,330,000	6,120 22,200 24,500 16,200 23,400 27,000 24,560 23,120 23,220	72 64 58 62 62 61 60 62 63



	,	
		•
i e		
		•
		,

The entire specimen, consisting of spleen and tumor mass, is 17 2-4 centimetres long, and varies in width and thickness at different places, as will be described later. It weighs 256 grams, about one fourth of which represents the weight of the spleen, the remainder the weight of the tumor. The tumor is attached to and apparently occupies the lower portion of the spleen. It is quite well encapsulated. The capsule of the tumor and the line of demarcation between the spleen and tumor are not easily distinguishable, so that the tumor mass appears to be continuous with the splenic substance.

The tumor is rather spherical in general outline and has a cumference of 23% centimetres. The surface of the tumor presents a rather nodular appearance, which is most marked along the lower and external surfaces. The mass is quite hard and firm, considerably more so than the spleen, and is of a dark purple red color, a color practically the same as that of the external surface of the spleen.

The specimen was cut in such a way that the incision ex-tended along the middle of the external or phrenic surface of the spleen, and then continued through the tumor mass surface of the tumor area is of a bright red color, quite uniform over the entire surface, but here and there are found dense bands of tissue of a white color with a slight tinge of blue. The dense bands are at certain places four millimetres wide, at other places they appear as delicate threads Some of them appear to be sharply defined from the surrounding red colored tissue, others seem to diffuse gradually into the surrounding substance. The dense fibrous tissue is rather irregularly distributed, and it is the contraction of this tissue that accounts for the place on the external sur face which produced a depression about one centimetre deep. The upper portion of the tumor fits into a concavity made by the base of the spleen The upper border of the tumor is readily recognized and easily distinguished from the splenic substance by the bright red color of the former as compared with the vellowish brown color of the latter At one place, however, the border line is not so readily noted It appears as if there has been a slight interchange of splenic and tumor substance Although apparently well circumscribed, a distinct connective tissue capsule is recognizable only at the periphery, where a small strip which is connected with the capsule covering the spleen and tumor externally extends inward between the spleen and tumor for about one-half centimetre on all sides. The tumor is nine and three-fourths centimetres long, eight and one-fourth centimetres wide, and seven and three-fourths centimetres thick.

The spleen itself appears to be but little affected. It has a pyramidal form, the base in contact with the tumor. The base is, however, not represented by a flat surface, but has considerable of a concavity which lodges the upper portion of the tumor mass. At the base the spleen is seven centimetres wide and four centimetres thick. The apex comes to a quite sharp point. The external or phrenic surface presents a normal convexity and is seven centimetres long. The intermediate ridge separating the gastric from the renal surfaces is quite well marked and is seven centimetres in length. The gastric surface is flat and only three and one-half centimetres wide at the base. The anterior margin is eleven centimetres long and contains no notches. The posterior border is more blunt and is only eight centimetres long. The hilum is located on the gastric surface, beginning six and one-half centimetres below the apex of the spleen, at first adjacent to the intermediate ridge, then extending outward and downward towards the anterior border, terminating at a point between the spleen and the tumor, two centimetres from the anterior border of the spleen. The ligaments constituting the pedicle of the spleen have an attachment extending from above the hilum downward, covering the internal surface of the tumor for two and one-fourth centimetres. The vessels passing into and coming from the organ enter the spleen directly through the hilum, with the exception of two, which enter the substance of the tumor. The spleen has a normal, dark purplish-red color and is normal in consistency.

The size of the spleen as compared with the size of the patient seems to indicate that there has been but little, if any, destruction of splenic substance.

On microscopic examination it is found that different portions of the tumor present different conditions. In most places there is found a dense field of cells, some of which are round, but the majority are spindle shaped. Most of the cells have a large nucleus rich in chromatin and surrounded by a small amount of cytoplasm, in others the cytoplasm is large in amount. Between some of the cells there is found the distinct elements of fibrous connective tissue. The dense white areas noted above

are made up of an almost homogeneous fibrillar connective tissue containing only a few muclei

The blood vessels of the tumor are very poorly formed most of them lined simply by endothelial cells or by the tumor cells themselves. In certain places a number of red corpuscles are seen lying free between the tumor cells. A section through the specimen at the place where the tumor borders on the splenic substance reveals the absence of a distinct capsule. The border line between the two structures can however be fairly well determined. The splenic tissue lying adjacent to the tumor substance consists of normal splenic elements very closely crowded together even more so than are the cells of the Malpighian corpuscles. In this dense splenic tissue which is from one fourth to one-half centimetre wide no blood vessels were found and only here and there an occasional red corpuscle so that this tissue can really be considered as a limiting membrane preventing any rapid spread of the tumor into the substance of the spleen proper. The splenic tissue elsewhere appears to be normal.

That the spleen is not an organ essential to the main tenance of a fair degree of health has had abundant proof through the numerous splenectomies of the past half century Thus of the 274 cases of extirpation of the spleen which it was possible for Van Verts to report in 1897 170 recovered while the 360 cases collected by Hagan in 1900 give a mor tality of only 38 3 per cent and we have no doubt that were statistics obtainable to the present time an equally good if not a much better showing could be made. The result is that the spleen is being rapidly forced into that large list of organs which are being subjected to operative procedure on the part of surgeons Of these procedures splenectomy has won for itself a fixed place and must henceforth be looked upon as a rational means of treatment in certain pathologic conditions of the soleen. Yet when we come to a consideration of what these conditions are which shall form such indication we realize that much remains to be done in this direction and in no particular class of cases is this more evident than in the treatment of neoplasms of this organ. The paucity of accumu

lated experience of the profession may be considered as responsible for this to a large extent.

It has long been recognized as a fact that the spleen is possessed of a relative immunity to secondary involvement by new growths, while the existence of malignant neoplasms having their origin primarily in this organ has been so infrequently observed that some doubt has been expressed as to their existence. Litten, in Nothnagel's Series, Vol. viii, 1898, states that "Primary sarcoma of the spleen is very rare." Mosler, in his work upon "Diseases of the Spleen," in 1875, knew of no case, and B. Grohe, in "Virchow's Archives," in 1897, writes as follows: "Tumors of the spleen recognizable during health occur very seldom. Of heteroplastic tumors of the spleen, only a few cases are known. Primary sarcoma appears more than doubtful, while primary sarcoma of the spleen is extremely rare."

Weichselbaum was the first to report any cases of primary sarcoma, if we exclude the case reported by Friedreich in 1865, under the title of "Multiple Nodular Hyperplasia of the Liver and Spleen," which Bunting, however, believes to have been a primary sarcoma of the spleen. Weichselbaum (Virchow's Archives, 1881) states that until that time there existed no records of any cases in medical literature. He then proceeds to report two cases. Since that time there may be found scattered through medical literature reports of a fair number of cases, which have been recorded as primary malignant neoplasms of the spleen. We herewith append a list of those so far recorded. The total number which we have been able to gather from various sources is thirty-two, including the one here It will be understood that much doubt must exist as to whether all of the cases included in this number rightfully belong there, as some of the cases were recorded as such without having their true nature determined by careful microscopic examination of the specimen. And in some of the cases the clinical history and gross findings are at variance with our present conception of primary neoplasms, as will be pointed out later in dealing with the operative cases.



1 · · · · ·		
•		

Of the above thirty two cases, twelve were subjected to operative interference eleven to splenectomy, and one to enucleation of the growth. The latter case was that of Hein ricius, in which instance there no doubt existed a pedunculated primary fibrosarcoma of the spleen, developing from its cap sule, which at the time of the operation was looked upon as a benien growth and was consequently subjected to enuclea tion, with the result that probably a portion of the growth remained through which recurrence took place. It was only after a microscopic examination of the growth was made that it was found to be a fibrosarcoma with myxomatous degenera tion Heinricius expresses himself as follows regarding this case "Had I known at the time of the operation that the growth was malignant it would have been more proper to have extirpated the spicen although the organ itself appeared, and evidently at the time was normal? Case died seven days after the operation

Of the eleven spienectomies three died following the operation namely, the cases of Flothmann Collins, and Krylow

The case of Flohmann was that of a man aged forty four years cachectic possessed of a four pound splenic growth which was adherent upon all sides to adjacent structure. At the termination of the operation there was observed in the omentum the existence of a tumor about the size of a man first. Its removal was also undertaken. Death followed fifty hours later from acute anxima. The spleen was studded throughout with innumerable small growths some as large as a hazel nut. As this case presents a picture somewhat typical of metastasis to the spleen it is believed there exists some reason for excluding it from among primary sarcomas of the soleen.

The case of Collins was that of a male aged thirty six years who had suffered severely from malarat ten years previously while a soldier in the English army in India since which he had however been apparently the English army in India since which he had however been apparently agrowth in the left side, which was increasing in size and at times was painful. He had lost fifteen pounds in weight in these months. No other symptoms existed. Blood examination revealed white corpusels 5000 harmoglobin to per cent. At the operation January 11 1900 the spleen was found to be extensively adherent to surrounding structures. A por tion of the pancreas was removed with the growth. A portion of the spleen not affected by the growth was allowed to remain attached to the

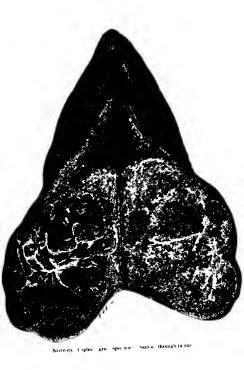
cardiac end of the stomach. Death followed on the sixth day, due to acute general peritonitis, pleuritis, and streptococcus septicæmia. Growth consisted of a small round-cell sarcoma about the size of two fists, and a sarcomatous mass size of palm of hand, with some pancreatic tissue and a small supernumerary spleen about the size of a walnut.

In the case of Krylow, which we quote from Simon, he having quoted the same from Hildebrand's Jahresberichte. "Splenectomy was undertaken in a patient fifty-one years old, much emaciated. Much hæmorrhage resulted from the operation, the patient dying four hours later. The tumor was reported to be a sarcoma, weighing eight and one-half pounds, which had existed for three years." The remaining eight cases which recovered from the immediate effects of the operation are as follows:

Case of Billroth (reported by Von Hacker). Patient, female, aged forty-three years. Tumor and spleen of large size, weighing 1450 grams. Tumor was smooth in front, but possessed of a protuberance posteriorly. Lower border divided by three fissures. The tumor was quite painful on pressure, which pain was reflected to left shoulder. The same was diagnosed by Billroth prior to operation as a sarcoma. The spleen was removed; it being the first case of splenectomy for sarcoma. The tail of the pancreas was found adherent to the tumor growth, seven centimetres of which were removed. The tumor was seventy-five centimetres in circumference, twenty-five centimetres in length, and eighteen centimetres in width. Microscopic examination showed it to be a lymphosarcoma. The growth had probably existed over ten years, as for that length of time at least there had been observed a marked fulness in the upper left quadrant of the abdomen, and for seven years there had existed two growths of a size sufficient to be palpable. The last two years were marked by rapidly increasing growth. Three weeks subsequent to the operation there existed a slight leucocytosis. The patient died six months later from recurrence.

Jordan's case was that of a patient, fifteen years of age, who in June, 1895, was subjected to an operation by him for the removal of an enlarged lymph node about the size of an egg, from the submaxillary region of the left side, which microscopic examination seemed to indicate as being a lymphosarcoma. Some time later the patient began suffering very severely from pain in the splenic region, and in August, 1896, the spleen was removed. It was found to be the seat of a sarcoma with metastases in the structure of the hilum. The patient is supposed to have died of recurrence. May it not be that this case should be expunged from the list of primary sarcomas of the spleen, owing to the fact that it may have been secondary to the sarcomatous lymph node previously removed?

In the case operated upon by Professor Kocher, no definite history is possessed as regards the case, excepting that the spleen was the seat of a lymphosarcoma with many regional metastases involving the liver and mesenteric lymph nodes. It was considered by Vulpius, Braun, Litton, and



others as a primary sarcoma of the spleen Simon, however, has raised the question as to whether the patient did not suffer from a generalized lymphosarcoma, in which process the spleen became secondarily involved

As regards the case of Herczel, we again quote from Simon, who quotes the same from Hildebrand's Jahresberichte

The ease was that of a fourteen year old boy, in which a growth had been noticed for one week. The extripated spleen measured twenty five by nineteen centimetres, and weighed 2456 grains. Within the otherwise perfectly normal spleen there existed what was considered a primary sarcoma of the spleen about the size of an apple. Following the operation there existed a marked leucocytosis the patient recovering, but as regards subsequent history nothing is known.

The case of Fritch was that of a woman aged thurty one years, multipara, who had since March, 1887, suffered with severe pain in the region of the spleen, at which time a small tumor had also been observed in the hypochondriae region, which grew rapidly until June 24, 1887, at which time she was operated upon Blood examination in this case was normal. The recovery was uneventful, and on the 24th of November the following yeashe gave birth to a still born child. The woman died six and one half years later of what was presumed to have been a cardiac lesion. No post mortem was obtainable. The spleen was seemingly normal, excepting at one point upon its convex surface, where existed the growth in the splenie structure, which upon seetion seemed to be well erreumseribed, although not sharoly so, from solenie structure.

Wagner's case was that of a woman aged twenty seven years, multipara, last confinement, which was followed by normal purepentum of two weeks' duration, preceded the operation by seven weeks. The growth, which was readily movable, and about the size of a child's head, was first noticed after her getting up from her confinement. The palpable surface of the tumor seemed more or less smooth, of about the consistency of the liver. Microscopic examination of the blood showed a normal relationship between the reds and whites and the normal quantity. The patient was operated upon November 30 1893. Recovery uneventful in April, 1894 her condition was excellent. Van Verts reports her in 1897, which is three years later, as in good condition. The splien and tumor weighed 1288 grams, and measured 19 × 96 × 10 centimetres

Garrés case, reported by Simon, was that of a woman thirty eight zero is age, iv para, who since her first confinement, eleven years prevously, had suffered some distress in the gastric region. When about five months advanced in last pregnancy, she began to suffer much from pains in left hypochondriac region, which however, subsided in the course of a short time. Normal confinement. In about five months there was a fecurrence of the pain in the left hypochondriac region, though not severe-

The general condition of the patient at this time was that of one being in fair health. Urine normal. Blood; reds, 4,310,000; whites, 5000 per centimetre. Growth felt in left hypochondriac region. Diagnosed as sarcoma of spleen. Splenectomy. Recovery uneventful. Blood count, postoperative: second day, reds, 2,350,000; whites, 8600. Seventh day, reds, 3,600,000; whites, 7800. Thirtieth day, reds, 4,100,000; whites, 7000. A hæmoglobin, 50 and 60 per cent. Spleen measured $22 \times 13.5 \times 11$ centimetres, and weighed 1750 grams. Microscopically, growth shown to be a round-celled sarcoma. Reported free from recurrence at the end of four months.

Of the eight cases that survived the immediate effects of the extirpation of the spleen, three cases have died of recurrence (Billroth, Jordan, and Kocher), and regarding one (that of Herczel) there exists no data which can be utilized in determining freedom from recurrence. Of the four remaining, two at least may be said to have been free from recurrence, namely, the case of Fritch, living six and one-half years, and Wagner's case being well at the end of four years. In the remaining two cases, namely, Garre's and the one here reported, it cannot be said that a sufficient time has elapsed since the operations to eliminate the possibility of recurrence; yet, the fact that the first was, after careful examination at the end of four months and the latter at the end of ten months, found to be possessed of good health, without any discernible evidence of recurrence, entitles one to the belief that freedom from recurrence may be the result. If this be true, primary sarcoma of the spleen may be looked upon as highly amenable to a cure through splenectomy, for, from the foregoing list of cases operated upon, we should, in trying to determine the amenability of the spleen to operative interference, in the case of malignant growths, exclude all cases where the same have given rise to metastasis or is under the suspicion of having been secondarily involved. Such would be a contraindication in any organ or tissue of the body. The three cases in which recurrence took place fall in this class.

It is quite possible that future experience may show that it will be necessary to further take into consideration, when determining the amenability of the sarcomatous spleen to extirpation, the tissues from which the same arises Thus the spleen offers three types of connective tissue from which it may originate First, the capsule and trabecula, second, lymphoid structure, and, third, the endothelial cells, which give rise respectively to the fibrosarcomata, lymphosarcomata, and endothelialsarcoma

Diagnosis —A diagnosis at an early stage, before the occurrence of metastases, is of course an essential in the treat ment of malignant growths here as elsewhere in the economy

The early recognition of malignant growths of the spleen presents some real difficulties, on account of the meagre symptoms, which result from its presence. We could only expect the presence of three symptoms, namely, I Enlargement of the spleen 2 Pam 3 Blood changes

The first symptom, namely, enlargement, must be dif ficul, of recognition in the early stage, owing to the protected position of the spleen making palpation impossible, while percussion is not to be relied upon. Owing to the only moderate support which the spleen has through the reflections of the peritoneum, it seems that the increased weight soon lengthens these attachments, with the result that the spleen at an early period acquires a range of mobility making it possible for it to descend below the costal margin, where it may become palpable, thus giving us the most trustworthy evidence possible of attainment in the light of our present knowledge of the subject. It having been determined that the growth pertains to the spleen, the nature of the enlargement will present itself for solution The physical characteristics of the growth will largely aid in this Thus, if the spleen is uniformly enlarged, with its normal shape well maintained, it would be a justificat on for excluding all primary neoplasms, at least in the early stage of their formation While if, on the other hand, the spleen is not uniformly enlarged, but the seat of nodosities, or localized enlargement, it would bring up for review those various conditions capable of bringing this about. If it is possible to determine by palpation or aspiration (this latter means of diagnosis is probably not so safe as that of exploration in capable hands) that the enlargement is cystic, then, of course, there is excluded echinococcus and other cysts as well as abscess of the spleen. The growth being a solid one, the question of its being a sarcoma, fibroma, angioma, or lymphangioma appears for solution; and this must certainly be at times quite impossible until the growth is exposed to inspection by an exploratory incision; although, in the instance of Billroth and Garre's, it is said that a diagnosis was made prior to operation. Theoretically, we would expect rapid growth, yet a review of the cases does not show this to be always so. This phenomenon has had much stress laid upon it as a symptom by Ledderhose, Litten, Braun, Krause, and others; but it must often fail in being of real value, owing to the fact that it must be very difficult to determine this in many instances; and if malignancy is suspected, it would seem unwarrantable to defer treatment until the rapidity of growth could be definitely determined.

- 2. Pain. Considerable pain would be expected to exist, owing to the distention of the splenic capsule; yet this does not seem to be a symptom of much value, as it is often absent, and if present, a misinterpretation of its significance must often occur, owing to the proximity of this organ to the stomach and left kidney.
- 3. Blood examination seems to be of no real value from a diagnostic stand-point as revealed by the results of those undertaken in the cases so far reported.

An analysis of the symptomatology of primary sarcoma leads to the belief that the diagnosis must, for the present at least, be largely based upon the recognition of the existence of a solid growth in the spleen, and that a definite diagnosis cannot be made until the spleen is exposed through an exploratory incision, which, it seems to us, would always be indicated where doubts exist.

Treatment. As to treatment, no question can exist as to the advisability, in the absence of secondary involvement of other organs, of removing the spleen, which in the hands of the experienced surgeon must be associated with but a small mortality, and it is believed that the results of the work so far undertaken are such as to justify the hope that a very large per cent of primary sarcomas of the spleen will be proven susceptible of a radical cure

BIRLIOGRAPHY

Asch Arch f Gynakol, 1888, p 130, Centralbl f Gynakol, 1898, Nr 52 Baccelli De primitivo splenis earcinomate, Rom, 1876

Birch Hirschfeld Lehrbuch der Path Anat, Fourth Edition, 1894, Vol 11, p 218

Bovaird American Journal of the Medical Sciences, 1900, Vol exx, p 377 Braun Handbuch der prakt Medicin, 1900, Bd 11

Bridges Chicago Medical Journal, 1868, Vol xxv, p 729

Bunting University of Pennsylvania Bulletin, 1903, Nos 7 and 8, p. 318. Casott Ein primares Sarkom der Milz, Inaug Diss, Wurzburg, 1899 Clark The British Medical Journal, 1883 VOI. p. 418

Collier Transactions of the London Pathological Society, 1895, Vol vlvi,

p 148 Dollinger Deutsche Aerzte Zeitung, 1902, p 181 Fink. Zeitschrift für Heilkunde, 1885, Band vi, p 399

Fink. Zeitschrift für Heilkunde, 1885, Band vi, p 399 Flothmann Munchener mediem Wochenschr. 1800, p 867

Friedreich Virchow's Archiv, 1865, Vol xxxiii, p 48

Fritch Quoted by Litten, Nothnagel's Spec Path u Therapie, 1898, Vol viii, Part III, p 221

Gaucher De l'epithelioma primitif de la rate These de Paris, 1882 Grohe Virchow's Archiv, 1897, Vol cl, p 324

v Hacker Vern der Deutschen Gesellsch f Chirurgie, 1884, Vol xiii, Part i, p 30

Hagen. Archiv für klinische Chirurgie, 1900, Band v, Heft 62, p 188
Heinricus Centralbi f Chirurgie, 1898, Vol xxx, p 607

Herczel Orvosi Hetilap, 1895, Nr 50, Ref Hildebrand's Jahresberichte, Band 1, p 879

Jordan Verhandl d Gesellch deutschet Naturforscher und Aertze, 1896,

Teil ii, Halfte ii, p 152 Kehr Handbuch der prakt Chir Band iii, i

Kocher Korrespondenzblatt f Schweizer Aerzte, 1888, p 649

Kraus Handb d prakt. Medicin, 1900, Band ti

Krylow Chrurgia, Juli, 1898, Ref Hildebrand's Jahresberichte, Band iv, p 764

Ledderhose Deutsche Chirurgie, Band 45b p 171, 1890

Litten. Nothnagel, Spec Path u Ther, Wien 1898 Mayer. Beitrag zur Chirurgie der Milz, Inaug Dissert, Greiswald, 1899.

Mosler Ziemsen's Handbuch der Spec. Path u Therapie, 1875 Vol viii, Part ii, p 139.

Notta. Arch Gen de Med. 1886, Vol xvii Quoted by Litten Parker New Hampshire Journal of Medicine, 1850, Vol 1, p 104 Perry. Glasgow Medical Journal, 1869, Vol. i.

Picou et Ramond. Archives de méd. exper. et d'anat. path., 1896, Vol. viii, p. 168.

Schönborn. Handb. d. Ther. innerer Krankheiten, Band ii, p. 206, 1897. Schönstädt. Inaug. Dissert., Wurzb., 1891.

Simon. Beiträge zur klinischen Chirurgie, Band xxxv, Heft 2.

Trelat. Gazette des hôpitaux, 1872, pp. 453 u. 460.

Van Werts. De la splenectomie Thèse de Paris, 1897.

Vulpius. Beiträge zur klinische Chirurgie, 1895, p. 11.

Wagner. Verhandl. d. deutschen Gesellschaft f. Chir., Band xxiii, 1, p. 155, 1894.

Warren. Annals of Surgery, 1901, Vol. xxxiii, No. 5, p. 513.

Weber, J. Ein Fall von primären Milzsarkom, Inaugural Dissertation, Erlangen, 1901.

Weichselbaum. Virchow's Archiv, 1861, Vol. lxxxv, p. 562.

Woodruff. Cincinnati and Western Journal of Medicine, 1867, Vol. ii, p. 471.

CASLS LLPORTED AS PRIMARY SALCOMA OF SHILEN

1 M Vacidasi Sifess morts berdeam Spheel Liner was hnowed by sindlar Principle Containing of the Chief Containing C	No	_	A	5+	Keponeu by	Spieen	Other Organs	
11 M Vacithael St. 12 M Vacithael St. 13 M Vacithael St. 14 M Vacithael St. 15 I Whete Shoundail St. 150 M Grobe 1877 85 16 F Casott Sp. 16 M Engling St. 17 M Engling St. 18 M English St. 18 M English St. 18 M English St. 18 M English St. 18 M					Priedreich 1865	82	Liver was involved by similar growths	Ę
11 M Vacchai T baum SS T Weber SS T		_			Weichsel baum 1881	- A P		
SI F Weber and by the polymer of t					Heichsel baum	Tumor arose in substance of spleen from which it was easily separable and projected above the concest surface	No metastrais	
by M Schonader by M Grobe 1897 as by M Bunting S 190 M Bunting S 190 M Bunting S 190 M Bunting S 190 M School S 190 M					1901 I Webet	quarter of which appeared upring of ernander being	Metasiasis in omertum and neal lymph node	mesentery retroperito-
po M Grebs A57 a5 O M Buning 6 1903 9 S F Casont 9 W Noodneff Predst		_		_	1891 Schonsudt			
o) M Buning Si 1900 1901 1901 1901 1901 1901 1901 190			_	_	Grohe 1897	39 by 13 by 18 centimetres. Per meated throughout by nodular growths but small amount of	It was adhered to d aphragm, stomach and left lobe of hyer	Abbe of lightness of a previous fall followed by pain in left side to be painted to
54 F (Casott 56 14 M Baccolill Western Street Freen Ramond Bowaltd Modelers Parker Parker Parker Parker Parker Parker Parker Parker Parker					Bunting 1903	Spicett entarged weighing 250 grammes Bulk of organ appears to be made up of gray the pears to be made up of gray	Metastasia to liver puncreas gastrohepatic lymph nodes and subcutaneous tissue	pancreas Had been incapacitated for bluedes tabor before death by reason of pa h and disconder for a period of only sixteen days.
as P Woodcaff Programmer of the Second Washington Second Woodcaff Programmer of the Second Woodcaff Woodcaff Parker Perry Bridges Clark Carker	_	_	_	_	Casott	Soon grammes		throughout the
43 M Baccell W Baccell W Baccell Trelat Precion Ramonad Box aird Mostler Parties Perty Bridges Clark e		_	_		Noodruff	Pendiculated tumor arising from		_
Preen Ramoud Bovalid Mosher Parker Parker Perry Bridges Clark *	- 2				Bacce)ll 1876 Trelat	Weight of spicen 2400 grains	Metasiasis hver gall bladder and descending colon	bladder
Mostler Parker Perry Bridges Clark					Preon Ramoud Bovaird	Have reported cases The pa	thological Picture va	ries from the
Parker Perry Bridges Clark	-				Moslier	CASES REIO	RTED AS CARO	VMONE
Ciaria	: = = =				Parker	A CANADA		

CASES SUBJECTED TO OPERATION.

			•				
	Classification of Growth.	Primary fibrosar- coma.	Primary lympho- sarcoma.	rimary small round-celled sar- coma.	Primary small round-celled sar- coma.	Primary lympho- sarcoma.	Primary lymphosarcoma.
	Symptom.	None except as manilested through presence of growth.	Not given.	None except presence Primary small of growth.	No symptoms except presence of growth in left hypochondriac region, and loss of weight.	For seven years had noticed growth size of two fists in left hypochondriac region. Rapid growth last two years. Marked pain.	
	Other Organs.	No mctastasis.	Extensive adhe- sions. Growth size of fist in omentum.	Extensive adhesions, involving pancreas and stomach.	Extensive adhe- sions to pancreas and stomach.	No adhesions on convex surface. Omentum and loops of intestine adherent at concave surface. Four centimetres of spleen removed with growth.	Metastasis liver and mescnteric lymph-nodes.
	Spleen.	Pedunculated fibrosarcoma arising from spleen. Weight, 500 grams.	Splenic tumor weighed four pounds and permeted by innumerable small growths, largest size of hazelnut.	Spleen and tumor weighed eight and a half pounds.	Size of growth that of two fists.	Spleen and growth weighed 450 grams and measured 25 by 18 centimetres.	Spleen uniformly en- larged.
	Result.	Death seventh day.	Death fifty hours after the operation from symptoms of acute anemia.	Death followed four hours after operation from acute anæmia.	Death sixth day after operation of general peritonitis, pleuritis, and streptococus septicarmia.	Recovery. Died six months later from recurrence.	plenectomy by Recovery. Subse- Kocher. quent death from recurrence.
	Splenectomy	Enucleated growth by Heinricius.	Flothmann. Spienectomy.	Splenectomy by Krylow.	Splenectomy by J. C. Warren. A portion of spleen left attached to stomach. Part of panereas removed.	Splenectomy by Billroth.	Splenectomy by Kocher.
	Reported by	Heinricius.	Flothmann.	Krylow.	Warren, 1901.	Von Hacker.	Kocher.
	Sex.		M.		M.	Æ.	<u>:</u>
	Age.		<u>2</u> 2	SI	36	£ 4	<u>:</u>
1	.oN	12	22	23	24	25	56

					37
Primary sarcoma	Primary round celled sarcoma	Primary endother list sarcoma Brither Round celled sarcoma Marchand	Pr mary lympho- sarcoma	Primary round celled sarcoma	Primary fibrosar
Science and sub- Extremations growth 1 Fourieres months Fail in plants creding Primary sercons	Preserve of growth Primary round recognized only one celled sarrouna week before the op-celled sarrouna street of the control of the control of the control of the control of the celled sarrouna week before the celled sarrouna celled sarro	Sev en weeks after last confinement which was normal northway was normal northway from his descent from it. Blood count nor mai	Severe pain for three or four months prior to operation. Fregunsh man five Tumor in left hypochondrise.	None except some pain and the pres- ence of the growth Durst on of growth not given	None except those of I resence of growth which was recing rised five months prior to operation
propertion mouths prevous to spice nectomy as en largement submarilary lymphonology which was a lymphosarcoma	No metastasis	No adhes on and no metastas s	Weigh of speenard No athesion and no Sires as by a genra metanisha centimetres a by a by so	No adhesion and no metastasis	No adheston and no metastas s
Sarromatous growth in spiecti melasta sis into hilum	Spicen and growth we ghed 2456 grams and measured 25 by 19 centimetres Sar comatous growth structure 5 re of apple	We ght 1235 grams Size 19 by 9% by so centimetres	Weight of spleen and growth a grams Size, 32 by 14 by so centimetres	Spleen and growth No adheslon and no we ghed 1750 grams metastass and measured 25 by 135 by 14 centimetres	Sphers and thmor we ghed 256 grams Tumor we ghed 150 grama and mers- ured 9% by 8% by 7% centimetres
Recovery and sub- sequent death by recurrence	Recovery Subse	Recovery No recurrence	Recovery unevent Jul. Normal con finement e ight months after oper attor. D'ed alg and a half years after operation of cardiae iesion	Recovery Condition of partient good at end of one year	Recovery Condi- tion of patient good at end of tra- months
Splenectomy by Jordan	Splenectomy by Herczel	Splenectomy	Fritch re- Spienectomy by ported by Fritch Asch	Sarre Carre	Jepson and Spienectomy by Albert Sepson
Jorden	14 M Herczel	Wagner 1894		Simon	F Jepson and Albert
2	*	8	<u> </u>	16	5
5.	-	<u>g</u>	<u> </u>	¥,	5
		*	**	**	

HERNIA OF THE UTERUS THROUGH THE INGUINAL CANAL.¹

BY JOHN HOWARD JOPSON, M.D.,

OF PHILADELPHIA,

Surgeon to the Children's and Bryn Mawr Hospitals and to the Out-patient Department of the Presbyterian Hospital.

THE following is the report of a case of inguinal hernia of the uterus, with operation and recovery.

H. B., colored, aged twenty-seven years, occupation, house-wife; married nine years; has had three children (all living), now aged eight, seven, and three years. No miscarriages; menstruation normal. Patient has had a small, right inguinal hernia as long as she can remember. This was about the size of a walnut, a small, hard, painless protrusion, which always descended when she was upon her feet and disappeared on lying down. It never was observed to be irreducible, and gave her no trouble. A truss had been recommended, but she had never worn one.

On January 20, 1904, one week before admission to the hospital, and while occupied in washing clothes, but not, according to her account, making any especially severe exertion, a large protrusion, much larger than ever before observed, made its appearance in the right groin. Its development was accompanied by severe pain in that region, forcing her to lie down. She remained in bed, the pain becoming more severe. She had neither vomiting nor constipation, and was not aware of the presence of fever, and had no chill.

She was seen by Dr. J. H. Cloud, who sent her to the Bryn Mawr Hospital on January 27, 1904. She was in excellent condition at that time. Examination showed a swelling, half the size of the fist, in the right inguinolabial region, coming from the external abdominal ring; hard, irreducible, somewhat tender, evidently an irreducible, complete, inguinal hernia. The absence of symptoms of obstruction, with her history, made probable the

¹ Read before the Philadelphia Academy of Surgery, March 7, 1904. 98

diagnosis of omental hernia—epiplocele Operation was advised, and consented to, and the pattent was admitted about noon of the same day. The temperature on admission was 98 2 5° F, her pulse and respiration normal. In the evening the temperature was 100° F. Dr. Walter Christie, the physician on duty, also examined her, and concurred in the advisability of operation.

Operation, January 28, Dr Christie assisting Under ances thesia the hernia was again examined and found to be irreducible No prolonged taxis was attempted An oblique incision over the neck of the tumor showed it to be pear-shaped, the wider end presenting, the sac adherent at the fundus or peripheral portion, and free at the constricted base. The sac was opened at the latter point and peeled away The examination of the contents was at first confusing, although we were still under the impression that the bulk of the mass was omentum While endeavoring to unfold it. it suddenly split longitudinally, and about three-quarters of an ounce of vellow, odorless pus escaped from its interior. This was quickly sponged away, and an ovary was then seen to be protruding from the inguinal canal to the right side of the neck of the mass, and what had been supposed to be a large intestine flattened out by pressure, was found to be the broad ligament and l'allopian tube of the right side. It was then discovered that the hermated mass was the uterus turned over forward, the supravaginal portion running backward, downward, and inward towards the cervix A vaginal examination determined the con timuity of the cervix with the mass, and the examining finger was easily felt through the upper vaginal wall immediately in front of it The necrotic and infected condition of the body of the uterus forbade its reduction, and it was decided to remove it with the right ovary, which was now prolapsed through the external ring This was done, after applying a series of silk ligatures to the broad ligaments, tubes, and supravaginal portion of the uterus, which formed the pedicle, and the adherent sac was also cut away The presence of pus in the cavity of the uterus rendered infection of the wound possible, and it was not deemed advisable to drop back the stump or to open up the inguinal canal and perform the Bassini operation as we had intended To secure drainage from the possibly infected stump, to exclude it from the perstoneum, and to close, as far as possible, the canal, we decided to fasten the pedicle in the external abdominal ring, and closely sutured the pillars of

the latter with chromicized catgut above, around, and below it. A small gauze wick was then laid over the stump, and the wound closed in its deeper portion by a continuous chromicized gut suture, and the skin with silkworm gut, the gauze being brought out at the lower angle.

After operation the patient's condition was excellent. temperature in the evening was 98 3-5° F., the pulse 92. following day, the 29th, a bloody vaginal discharge appeared. The highest temperature recorded after operation was on the evening of the 29th, 100 1-5° F., the pulse 80. The wound was dressed on the 30th, and when the gauze wick was removed, a small quantity of bloody mucus followed it, and again on February I, when a small rubber tube was inserted instead of the gauze, to drain away the mucus discharging from the stump. This was removed two days later, and the wound quickly healed without infection, being solid, and the stitches removed on the tenth day. The vaginal discharge lessened and disappeared in a few days after operation. The patient complained of some pain across the lower portion of the abdomen after the wound was healed, but this soon disappeared. Menstruation appeared on February 25, was profuse, as usual, and lasted four or five days, with the usual slight pain in the hypogastric region. The patient was allowed to get up after four weeks, and suffered no further inconvenience. An examination made February 29 showed the wound solidly healed, no hernia or unusual impulse on coughing on that side, the stump of the uterus easily palpable by bimanual examination and slightly movable, upward and downward, the cervix being tilted somewhat downward.

Sections through the body of the uterus were made by Dr. W. Bradford Eaton, Pathologist to the Hospital, who very kindly furnished me the following report:

"The section studied was taken from the uterine wall, bordering the large abscess ruptured at time of operation (uterine cavity). The wall was of average thickness, and showed direct evidence of pyogenic infection. The sinuses in places were densely infiltrated with polymorphonuclear leucocytes, and scattered through the specimen were many foci of densely crowded pus-cells. The part of the specimen bordering upon the abscess showed what at first seemed to be a remnant of placental tissue, but which further study showed to be particles of blood-clot that were held by the necrotic

remnants of the endometrium. Here and there could be seen remains of mucous glands and occasional strips of degenerated uterine mucosa. The condition corresponded to that found in in tense hamorrhagic and pyogenie infection, such as was apparently present in this case."

The persistence of menstruation is explained by the fact that the amputation was done some little distance above the internal os, and the left ovary was not removed, although its tube was, of course, tied off with the pedicle. It was not drawn out or observed during the operation

While the presence of an ovary in the sac of an inguinal hemia is not very uncommon, most operators of large experi ence having encountered it one or more times, the presence of the uterus is one of the rarest phenomena of herma. But while of great rarity, its occurrence has not escaped the attention of some of those who have made a special study of hernia and of affections of the female genitalia, and cases of umbilical, ven tral, inguinal, crural, and of alleged obturator and ischiatic hernia have been recorded. The ventral forms occur most fre quently, being usually situated below the navel, from separation of the recti muscles during pregnancy, and will not be considered here. The cases of other varieties than umbilical and ventral, except inguinal and crural, which are on record, viz, isclitatic and obturator, are probably apocryphal Careful studies of the cases of inguinal and crural hernia of the uterus which are on record have been made from time to time by Cormack, 1 Klob, 2 Eisenhart, 3 Adams, 4 Winckel, 5 and Kustner,6 who have compiled lists of the cases, more or less com plete A careful study of these papers shows that considerable confusion exists as to some of the cases in the early literature, both as to their authenticity and their exact nature. Thus the oldest case, that of Nicholas Pol (1531) has been claimed to be identical with one of those mentioned by Senertus and Hildanus (1610), while another described by these authors, and attributed to Doringius, is variously classified as inguinal and crural, or omitted Another case, given by Skrivan and Lumpe as a true herma of the pregnant uterus, has been excluded on the ground that it was an extra-uterine pregnancy. By a study and comparison of these papers and of many of the original references, and a review of the literature since their appearance, the following classification of the cases seems justified. It is practically the same as Küstner's, with the addition of six cases which he excluded, or overlooked, or which have been published since his article appeared. The pregnant uterus has occupied the sac of an inguinal hernia in whole or in part nine times (observations by Pol, Senertus, Saxtorph, Ladesma, Fischer, Rektorzik, Scanzoni, Winckel and Eisenhart, Rosanoff). The non-pregnant uterus has been previously observed in inguinal hernia at least twelve times (Maret, Lallement, Chopart, Olshausen, Leopold, Schwarz, Brohl, Krug, Defontaine, Legueu, Rouffart, and Diederich). Two undisputed cases of crural hernia of the non-pregnant womb have been recorded by Lallement, and Boivin and Dugès, and the case of Doringius previously mentioned, a hernia of the pregnant uterus, has been variously classified as inguinal, crural, or possibly between the muscular fibres of the abdominal wall, or altogether excluded.

The case of F. Krug ⁷ has not been included heretofore, Winckel and Küstner, writing since its publication, not mentioning it, but is an undoubted example of hernia of the non-pregnant uterus, left ovary and tube, of the left inguinal variety. The case of De Gouey,⁸ of removal of a fœtus from a hernial sac, is, judging from the quaint and interesting account translated from the Sloane Manuscript, apparently an example of extra-uterine gestation, as the much-discussed case of Skrivan and Lumpe was finally decided to be. Other cases not included in previous statistics are those of Defontaine,⁹ Legueu,¹⁰ Rouffart,¹¹ and Diederich,¹² abstracts of which follow.

The unimpregnated uterus may be congenitally herniated, or the accident may occur in early life, or during or after the child-bearing period, usually when the pregnancies have been multiple and numerous; and the uterus may become impregnated in this condition. The pregnant uterus may also

enter a pre-existing herma and pregnancy go on until the full term

The etiology, symptomatology, and diagnosis of this condition have been given at length in the articles quoted, and it is unnecessary to dwell upon all of them There are, however, several points suggested by the history of our case which are of interest. She was the mother of three children. Multiple pregnancies are an important predisposing factor to hernia of the womb She had had a small, right inguinal hernia all her life, probably a congenital hernia, and perhaps of the ovary. The presence of a pre-existing hernia is a predisposing factor, and an ovary may be in the sac, and by its traction on the uterus, especially when adherent to the sac, and the latter is increasing in size, aid in drawing the uterus outward a relatively large proportion of these cases there are congenital anomalies present, as a rudimentary uterus, bicornute uterus, congenital liernia, imperforate vagina, pseudohermaphroditism, shortening of the round ligament, associated with increased liability to uterine hernia. In pre-existing hernia the sac probably often enlarges at the expense of the broad ligament on that side, making direct traction on the womb. The only organs in the sac were the uterus and its ligaments, the right ovary and tube, and part of the left tube Both ovaries may accompany the uterus in its excursion, usually only one, that of the side on which the hernin is located. There was no omentum present, adhesion of which to the uterus might have caused its displacement by traction (Chopart's case). The nationt was washing clothes when the accident occurred, probably bending over and exerting herself more than she acknowledges Severe sudden exertion, causing increased intra-abdominal pressure, is an important exciting cause. It is a curious fact that both of Lallement's cases occurred in washerwomen The uterus was probably practically strangulated, a unique accident It was necrotic, splitting open under manipulation and discharging pus from its cavity. The microscopic examination also showed inflammators changes in the tissues of the uterus

Diagnosis.—No suspicion of the true nature of the contents of the hernia was entertained before operation. diagnosis made was of probable omental hernia, from the absence of symptoms of intestinal obstruction. The presence of a pyriform mass, hard, perhaps irreducible, would be consistent with the presence of the uterus, and in some cases a smaller round or ovoid movable body alongside of it, the ovary, has been described, and a correct diagnosis arrived at. A vaginal examination before operation would have revealed an absence of the uterus from its normal position, and a change in the direction of the cervix and vagina. As Eisenhart points out, the introduction of a sound is difficult. A painful swelling of the herniated uterus during menstruation has been described. In pregnancy occurring in a herniated uterus, or in one horn of a bicornute uterus, the usual objective signs of pregnancy may be elicited as pregnancy progresses, the uterus meanwhile steadily increasing in size.

Return of the uterus would have been indicated had its condition permitted, but under the circumstances there was no alternative but hysterectomy. The left ovary was not prolapsed, and its removal was unnecessary. Conservation of the pelvic organs as far as possible, at least where functionating, would seem to be indicated.

In addition to the case here reported, operations for hernia of the non-pregnant uterus have been done by Leopold, Schwartz, Brohl, Krug, Defontaine, Legueu, Rouffart, and Diederich. Leopold ¹³ successfully excised one horn of a bicornute uterus, with the tube and ovary, from an inguinal hernia. There was an imperforate vagina in his case, as there was also in Schwartz's ¹⁴ case, in which there was a double congenital hernia, with failure of union of Müller's ducts, the right hernia containing a "uterus in miniature," which was replaced, the left containing a muscular cord, which was excised. The patient recovered.

Brohl's 16 case was a pseudohermaphrodite of the female sex, thirty-six years old, with a left inguinal hernia of six years' duration, which was correctly diagnosed before opera-

tion to contain the uterus and ovary. He amputated the uterus and both ovaries one of which was rudimentary, and fastened the stump to Poupart's ligament to close the canal. The uterus was bicornute. This patient also recovered. His treat ment of the stump was practically the same as that followed in our case.

Krug 7 operated on a left inguinal hermia of the uterus and ovary congenital the uterus reducible the ovary adherent in an unmarried girl aged nineteen years. The hermia had existed as long as she could remember symptoms for five months only. A correct diagnosis of the contents was made before operation. The six was apparently formed from the left hroad ligiment explaining the irreducibility of the ovary which was adherent to it. The uterus was reduced the left tube and ovary removed and the sac excised, elosure by the McBurney method. The patient died fifteen days after operation apparently of an intense amemia with cardine degeneration no sepsis. Post mortem examination showed the right broad ligiment exceedingly long running behind the posterior surface of the uterus so that the right tube and ovary were on the left side of the uterus.

L Defontaine performed radical cure on a hernia left ingiumal existing for five months in a child aged seven months. It continued the uterus and both ownes being complete of the uterus and the contents were returned to the abdomen after directal divulsion of the runes.

Legueu 30 reports a case of left inguinal hernia in a girl of eighteen years congenital and containing the uterus which was very small one ovary and both malformed Fallopian tubes one ovary being waiting. The vagina was imperforate. He operated reduced the organs into the abdomen and the patient recovered.

Rouffart if reports a case in a girl aged twenty two years with congenital hernia which for three weeks had been very painful and sensitive. The vagim was imperforate the other sexual characteristics well developed. On operation the uterus was found rudimentary, apparently unicornuite adherent to the

sac, the left tube and ovary in the abdomen, the right absent. These organs were removed, and the patient recovered. It may be noted that this case is an exception to the almost universal rule that at least one ovary is present in the hernia with the uterus.

Diederich ¹² reports a case similar to Rouffart's, in a girl of twenty-one years, also with imperforate vagina, in which the rudimentary uterus, with the left ovary and tube, was removed. The right adnexa were not discovered.

The frequent association of imperforate vagina with a rudimentary congenitally herniated uterus in the cases reported in recent literature is of interest. It is probable that the more frequent performance of operations for radical cure has revealed cases of this nature which were previously assumed to be herniæ of common types.

REFERENCES.

- ¹ Cormack, Sir John Rose, K. B. Clinical Studies, Vol. i, 1876. Also Edinburgh Monthly Medical Journal, July, 1841.
- ² Klob, J. M. Pathological Anatomy of the Female Sexual Organs, American Edition, trans. by Kammerer and Dawson, 1868.
- ^a Eisenhart, H. Arch. f. Gynäk., 1885, Vol. xxvi, p. 439.
- Adams, S. S. American Journal of Obstetrics, March, 1897, Vol. xxii, p. 225.
- Winckel, F. V. Lehrbuch d. Geburtshulfe, etc., 1893.
- 6 Küstner, Otto. Veit's Handbuch d. Gynäk., 1897, Vol. i.
- ⁷ Krug, F. American Journal of Obstetrics, xxiii, 1890, p. 606.
- De Gouey, Sieur Louis L. La Veritable Chirurgie, Etc., 1716. Translation in Obstetrical Journal of Great Britain and Ireland, Vol. i, 1873-4, p. 241.
- Defontaine. Arch. Prov. d. Chir., iv, 1895, p. 333.
- ¹⁰ Legueu. Semaine Gynéc., 1897, No. 18; Ref. Cent. f. Gynäk., 1897, No. 43.
- ¹¹ Rouffart. Ann. d. l. Soc. Belge de Chir., viii, 1900, p. 228.
- ¹² Diederich. Ann. d. l. Soc. Belge de Chir., viii, 1900, p. 239.
- ¹² Leopold. Archiv f. Gynäk., xiv, 1879, p. 378.
- ¹⁴ Schwartz. VI. Congr. Franc. d. Chir. Rev. de Chir., 1892, p. 441.
- ¹⁵ Brohl. Gesellsch. f. Geburtsh. u. Gynäk., 1893; Cent. f. Gynäk., 1894, p. 390.

SUTURE OF THE BRACHIAL ARTERY

BY DASTON TOPPANCE M.D.

OF BURNINGHAM ALABAMA

Su seon to St Vincent a Hosp tal

On December 21, 1903 John Roberts white aged seventeen years while working in the mines had his left arm badly crushed about midway between the elbow and shoulder by the wheels of one of the cars. The muscles on the outer side of the arm were badly lacerated exposing the bone and the coal dust was so deeply ground into the tissues that it was impossible to remove it. He was brought to St. Vincent's Hospital late that afternoon A wet dressing was applied by the resident. I saw him the following morning. His temperature was then above 103° F. I introduced a small rubber tube on the inner side of the arm and put on a constant irrigation of bieliloride t. 4000. The fever immediately began to subside and at the end of a week the wound was perfectly clean and the irrigation was discontinued.

On December 28 the arm began to bleed profusely. The Sister in charge of the ward applied a bandage firmly just below the shoulder and controlled the hæmorrhage until he could be brought down to the operating room where I saw him at once Upon opening the wound the artery showed a funnel shaped ulcer which hid perforated the opening being about as large as the point of a pencil and 3x every pulse-beat the whole of the blood stream was forced out through this opening. There was no sign of a radial pulse and the arm was cold and edematous and of a dark color.

My first impulse was to catch up the artery with a pair of forceps and ligate it but remembering Dr Crile's work on temporary ligature of blood vessels. I decided to try to suture the wound trusting that the blood had not clotted in the distal end. While waiting for the instruments and suture material, the hiemorphage was controlled by pressure. My first suture was introduced with the arm extended but tore out when tied and I saw that it would be necessary to flex the arm and keep it in that position.

I used a small, full-curved intestinal needle with fine silk, introducing it as a purse-string, and upon tying it found that it completely controlled the bleeding. Only one suture was used. A portion of the muscle was dissected up and grafted over the sutured portion of the artery. A dry dressing was applied, and the arm put up in a right angle external tin splint. The hand was slightly elevated and placed on a large hot-water bottle. I could not find the radial pulse when the operation was finished. I saw him again about five hours later, and the radial pulse was as strong as in the other arm, and the puffiness had left the arm, which was now warm and normal in appearance.

A close watch was kept day and night for a week in case the suture should give way.

He was kept in bed about two weeks, and the arm was kept in the splint for two months.

The muscle graft grew over the artery firmly, and could be watched for several weeks before the skin-flaps covered it over.

The wound has healed up perfectly over the sutured artery, and he is beginning to use the arm some.

PYÆMIC GLANDERS IN THE HUMAN SUBJECT.

REPORT OF A RECENT CASE OF LABORATORY ORIGIN TERMINATING IN RECOVERY

BY J CLARK STEWART, MD,

OF MINNEAPOLIS, MINN

Professor of Principles of Surgery in the Med cal Department of the University of M. mesota

This case occurred in one of the assistant bacteriologists of the Minnesota State Board of Health, and was due to accidental infection while working upon material from two fatal cases of human glanders which occurred near Perham, Minnesota

Dr MeD, aged twenty seven years previously in perfect health, had been working with this material for some weeks when she became slightly indisposed, and after a few days was compelled to go to bed with symptoms resembling typhoid fever On Saturday afternoon, June 21, she had malaise, and in the even ing noticed a headache and slight backache. After about an hour s sleep she was awakened by darting pains through the back and lower extremities. The pains steadth increased in severity and extended in less marked degree to the chest and arms. The feet and legs were cold but no chill or chilly sensations were experienced. The body and head felt very hot and dry, and the pains persisted for about twelve hours. Sometime during the first twelve hours a pun was referred to the region of the diaphraem which persisted for about five days, and was aggravated by respiratory movements. During the first few hours of the attack nausea was present, but there was no vomiting at any time. There was herry sweating during the afternoon and night of the second day, which at first was thought due to the administration of salicylates. but it continued to a marked degree during the first two weeks of the illness. The temperature when first taken about six hours after onset of the pains was 1028° [In six hours more it reached 1045° I, and it then receded being at 4 PM on the second day 103° I at 9 PM 1028° F, at 8 a W on the third day 100 5° F, at 7 PM 100° F on the fourth day at 8 AM

98.8° F. The patient remained in bed two days, and on the morning of the fourth day got up (temperature normal), walked several blocks and remained up all day. In the evening the temperature was found to be 102.8° F. On the evening of the seventh day an oval edematous swelling about two inches long appeared at the right wrist over the region of the ulnar nerve, which was quite sensitive to pressure. Another less prominent swelling was present in the left arm at the outer border of the biceps, extending downward from midpoint of biceps about three inches, the width being about three-fourths of an inch, and this was also extremely sensitive to pressure. Deep in the calf muscles of the right leg was a third tender region two or more inches in length, which could not be definitely outlined.

On the eighth day the swellings were more prominent, especially the one on the wrist over which the skin was slightly reddened. This redness had disappeared on the ninth day when the patient was first seen by me. There was then marked induration about the original point of the swelling in the left arm, and the right calf was noticeably fuller over the inner aspect. Blood count (Dr. White) showed 8500 leucocytes.

On July 8, I incised the swelling at the right wrist under local anæsthesia and opened a cavity, evacuating about a drachm of purulent material which seemed surrounded by an albuminous covering, so that it came out like the yolk of an egg surrounded by the white. The cavity was then packed with iodoform gauze after mopping it and the skin incision with 95 per cent. carbolic followed by alcohol.

Cultures (Dr. Beckmann) from the pus removed gave a pure growth of Bacillus mallei, and several guinea-pigs inoculated intraperitoneally with two cubic centimetres of a broth emulsion of the pus died in from twenty-four hours to four days.

The organism recovered at this time seemed slightly less virulent than that from the cases from which the inoculation occurred.

After this, the treatment of the other swellings in the left biceps muscle and in the calf of the right leg was considered; operation upon these was postponed to allow time for encapsulation, because the fever seemed to be dying out and no other lesions were appearing, and also to determine whether new lesions would appear as the result of the opening of the first focus. On July 22 an attempt was made to dissect out the bicipital focus intact

without opening the abscess, but this failing, the wound was filled with 95 per cent carbohe, through which the pus was allowed to escape and mopped away, when the wound was filled with alcohol and dried and packed with todoform gauze

This focus was situated entirely within the biceps muscle and had destroyed quite an extent of the muscular fibres

In the leg a careful dissection was made from behind through the calf dividing the gastroenemus and colcus in the middle line, and the absects cavity was found between the solcus and the deeper museles apparently formed at the expense of the latter. In this case the large wound was filled with 93 per cent, carbolic and the absects incised through this, and after removal of the pus the museles and skin were sutured, leaving only a central opening for packing the absects cavity. At the same time the original wound at the wrist was curretted and carbolized.

All the wounds healed kindly without any skin infection, but it was over two months before healing was complete

Cultures (Dr Beckmann) from all the foe at the time of the operation showed virulent pure growths of Bacillus mallei, and one week later the dressings from all the wounds showed the bacilli, but in very small numbers *

On August 5, an influend lymph node was enucleated from the left submaxillary region, it having been tender and swollen for only about four days, and within this was a purulent focus con taining virulent Bretili maller. This wound was carbohized. During this time the fever had been quite constant, but varying widely, with an afternoon rise from 100° to 103° F. Ten days after the removal of the last focus the temperature dropped to normal, and remained so with slight occasional evacerbations until September 22, when after attempting to do a little work at the laboratory site had a slight chill headache brekaelte, and milaise with some purpure spots on abdomen and legs and temperature ran up to 103.5°. If After three days the temperature rapidly dropped to normal and remained normal and subnormal for three days until Septem

A full account of the bacteriological findings in this case and also in the two from which the infection arose with the details of the work done on them in the Laboratory of the Munnesota State Board of Health Dr F F Insbrook Director can be found in his annual report for 1993-1902.

ber 28, when after walking several blocks the temperature again rose without a chill to 104° F. in the afternoon, and remained high (above 103° F.) until October 2, when it began to subside, reaching normal the next day. During this attack of pyrexia a second purpuric eruption appeared scantily over the limbs and abdomen. October 7, the temperature again rose gradually and dropped to normal on the 10th, remained below normal three days, after which time there were no marked exacerbations, but a quite regular afternoon rise to 99½° and 100½° F., which persisted until the latter part of May, 1903.

During the febrile attacks there were no local symptoms except a heavy feeling and ill-defined pain near the insertion of the diaphragm upon the vertebral column. There was never any definite tenderness anywhere in the abdomen, but only an ill-defined discomfort behind the stomach to the left side, not associated in any way with the taking of food.

At the time of the first pyrexial attack all the wounds were solidly healed except a small sinus in the left arm, and this healed during the persistence of high temperatures.

After this the patient's general condition improved, and she seemed well except for the slight afternoon rise. She spent the summer out of doors and in the fall seemed as well as ever. She has since had no fever nor any symptoms pointing to a persistence of the infection.

This case seems worthy of record from its most fortunate termination and the extreme rarity of laboratory glanders. Certain points seem of especial interest.

First, its origin from two cases of most virulent pyæmic glanders in young men owing their infection to contact with diseased horses. Both cases began with symptoms resembling typhoid fever, rapidly passing into those of sepsis. Both died on the seventeenth day with multiple abscesses in the skin and subcutaneous tissue, the skin lesions being so numerous as to excite the suspicion of smallpox.

Second. The incubation period in Dr. McD.'s case was six days, figuring from the only known chance of infection, she having made an autopsy upon an inoculated guinea-pig on

June 16, and having at that time a small open wound on her finger

Third The absence of the lesions of the skin and mirrous membranes which are so common in most cases of glanders and the limitation of the original foci to the voluntary muscles

The points aimed at in the surgical treatment of the case after an exact diagnosis had been made, were, first, delay in hopes that the foci might become encapsulated by inflammatory changes in the surrounding tissues, and that the patient might become as far as possible immune by the manufacture of her own mallein. Second, the avoidance of local implantation of Bacilli maller upon wound surfaces when foci were eradicated

Several methods aiming at the prevention of inoculation were suggested, including the actual cautery, but the use of or per cent carbolic and alcohol on all the cut tissues before exposing them to pus contact proved entirely satisfactors in preventing further local lesions, and allowed the wounds to heal promotly except where the packing and anatomical conditions favored the persistence of a sinus

It is difficult to account for the train of symptoms arising after all the wounds were practically closed. The repeated attacks of high fever, general prostration, aching, etc., with purpura, certainly suggested some internal glandular focus, but the subsequent complete though tardy recovery would seem to negate this view

The medical and surgical treatment used throughout was an attempt to meet as far as known the theoretical conditions present, and that it was successful is a matter of constant selfcongratulation on my part and on the part of my colleagues in the Pathological Department of the University of Minnesota

and the Minnesota State Board of Health

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, February 24, 1904.

The President, HOWARD LILIENTHAL, M.D., in the Chair.

TRAUMATIC RUPTURE OF SPLEEN; SPLENECTOMY.

Dr. Irving S. Haynes presented an Italian boy, nine years old, who, on December 28, 1903, at one o'clock in the afternoon, was run over by a light buggy, the wheel (or wheels) traversing his body from the splenic region to the left groin, and down between the legs.

On admission to the hospital the patient was in a condition of shock, but conscious. The abdomen was rigid and tender over the splenic and left inguinal regions, and the child complained of colicky pains. Upon admission, his temperature was 97.8° F.; pulse, 92; respirations, 26. After the administration of a saline enema, an ice-cap was applied to the abdomen, and the patient was stimulated with strychnine and whiskey. At 5 P.M. his temperature had risen to 100.3° F.; pulse, 104; respirations, 28. At 9 P.M. his temperature was 100° F.; pulse, 138; respirations, 40. At I A.M. his temperature was 98.6° F.; pulse, 140; respirations, 48. As the patient's condition was evidently growing worse, and evidences of internal hæmorrhage were more marked, an exploratory laparotomy was deemed advisable. Under chloroform anæsthesia an incision was made in the median line, a little below the umbilicus. The abdominal cavity was found filled with bloody The intestines fluid, which escaped on opening the peritoneum.

were hastily examined, but nothing found As the child had complained of pain over the upper left quadrant of the abdomen, a second incision, four inches long, was made in the left semilinar line On palpating the spleen, that organ was found to be run tured, its entire anterior border being severed from the body of the organ with the exception of a very narrow pedicle severed section was about the size of an adult forefinger incision was enlarged by a right angled cut running two inches to the left The spleen was then loosened from its attachments and brought near the opening, with the intention of placing a row of mattress sutures parallel with the crushed surface and removing the torn section As the organ was being carefully manipulated. and the pedicle held between the fingers, something was felt to loosen and slip Fearing that a rupture of the blood vessels was imminent, a clamp was at once placed upon the pedicle and the spleen cut away A catgut ligature (chromic, No 2) was then placed on the pedicle internal to the clamp, which was left in place as an additional safeguard The child's condition being very serious, a saline enema was administered and hypodermic stimula tion was freely resorted to. The abdominal wounds were rapidly closed with through and through silkworm gut sutures

On the first day after the operation the temperature reached 1016° F. pulse, 132, respirations, 52 Free stimulation and saline enemas were resorted to During the day the child vomited some brownish fluid. On the following day the temperature reached 102° F, pulse, 138, respirations, 40 On this day the patient vomited a bright green fluid. The clamp was removed On the third day the temperature fell to 100° F, pulse, 136, respirations, 38 Saline and nutrient enemas were continued The patient had three stools The urine was normal From this time on convalescence was uneventful until the twentieth day. when the temperature suddenly rose to 1062° F, pulse, 152, respirations, 32, this followed a distinct chill during the night A physical examination of the chest revealed slightly roughened breathing sounds. This soon cleared up, and the temperature fell to normal within twenty four hours The patient was dis charged cured on January 31, 1904

The following was the result of blood examinations made by Dr Krauskopf

January, 1904.	White Cells.	Red Cells.	Hæmoglobin, Per Cent.
3	20,600	4,800,000	85
5	18,600	4,700,000	85
7	17,600	4,950,000	90
9	16 ,0 00	4,800,000	95
II	20,000	5,000,000	100
14	18,000	5,000,000	100
31	18,000	5,000,000	100
Urine, normal.			
Fæces, normal.			

PERFORATED GASTRIC ULCER.

DR. CHARLES H. PECK presented a man, aged twenty-three years, who was admitted to Roosevelt Hospital, in the service of Dr. Robert F. Weir, at 5 A.M., January 10, 1904. A diagnosis of perforated gastric ulcer had been made by the ambulance surgeon. This was confirmed by the house surgeon and the operator, and an immediate operation was performed four hours after the onset of acute symptoms of perforation.

The patient's history was as follows: Measles in childhood, pneumonia three years ago. For two years the patient has been troubled with indigestion; after eating he would have severe abdominal pain, knife-like in character. He frequently vomited soon after eating; sometimes the pain was so severe that he irritated his pharynx and made himself vomit; he had never vomited blood, nor passed blood by the bowels. Five months ago he was in Bellevue Hospital for a week for his pain after eating. Was told it was imaginary and sent home.

Present Illness.—Last night at nine o'clock he ate a light supper, as he did not feel well; had some abdominal discomfort. He went to bed about twelve o'clock, and about two hours later he was awakened by a terrible sudden cramp in the stomach; he cried out in agony, and felt a desire to defecate. He felt terribly weak and prostrated; the pain continuing, he drank a lot of water, which he soon vomited; it was bloody; two hours later the ambulance was sent for and he was brought to the hospital.

On admission his temperature was 98.4° F.; pulse, 124; respirations, 28. There was marked general tenderness over the entire abdomen, with extreme rigidity, both tenderness and rigidity being greatest in the epigastrium. No loss of liver dulness was noted; distention was very moderate; face pale, drawn, and anxious.

Operation at 6 AM, ether A four-inch median incision above umbilicus. on opening peritoneum a quantity of gas and some turbid serum escaped Pyloric end of stomach was pulled into view, and a perforation about one fourth inch in diameter exposed on anterior aspect of pylorus, from which gas and fluid were escaping. Stomach wall for some distance around perforation was much thickened and infiltrated, the cystic duct and pylorus being matted together in the inflammatory mass. The per foration was buried with three tiers of continuous Lembert sutures of black silk, with some difficulty on account of infiltration of tissues Escaped stomach contents and turbid serum bathed the entire peritoneal surface except lesser cavity, a considerable quantity was present in the pelvis and in both flanks. also between liver and diaphragm. Thorough flushing with a Blake tube and salt solution until fluid returned clear, a cigarette drain then placed down to suture line in stomach wall and the rest of wound closed by layers

Course—Temperature rose to 102° F after operation, then gradually fell, remaining below 100° (rectum) after the third day, pulse, 130 after operation, dropped to 80 on third day and remained normal. The day following the operation he vomited a few times, the vomiting at one time being projectle in character, his bowels were moved by enema thirty hours after operation, and the vomiting soon subsided. Saline enemata and later nutritive enemata were given for the first three days. Hot water by mouth on the second day, milk up to four ounces every two hours on the third day. Solid food was commenced on the eighth day and increased gradually. Sat up on the nineteenth day and left the hospital well on February 1, the twenty-second day after the operation.

Dr. Peck also presented a man, aged twenty two years, who was admitted to Roosevelt Hospital, in the service of Dr. Robert Γ Weir, early in the evening of January 21, 1904

The probable diagnosis of perforated gastric ulcer was made by the house surgeon. His history was as follows. He had been troubled with pain in left inguinal region and outer and anterior aspect of thigh for some months, and had been under treatment for it. Was never troubled with indigestion until about three weeks before admission, since when he has had pain after eating and occasional vomiting. He worked as usual on the day of admission until 4 P.M., when, after lifting some heavy glass, he was suddenly seized with severe cramps in the abdomen. He was obliged to stop work immediately and went to a neighboring saloon, where he was given a drink of brandy. He vomited it in a few minutes, and the pain became so violent that he laid on the floor and rolled in agony; the ambulance was sent for at once

On admission his temperature was 102.2° F.; pulse, 124; respirations, 28. Leucocyte count, 16,000. There was marked general tenderness and rigidity over entire abodmen, somewhat greater above umbilicus, but not distinctly localized. The greatest pain was in left inguinal region and upper, anterior aspect of thigh, the old location. There was almost complete loss of liver dulness, and flatness in both flanks, which changed its level as patient was turned from side to side. No distention. Cardiac and pulmonary signs normal; general condition good.

Operation at 10 P.M.; ether. A four-inch median incision above umbilicus. Gas escaped on opening peritoneum, with some turbid serum. Flakes of lymph seen on anterior surface of stomach and under surface of liver, as well as on surrounding peritoneum. The anterior surface of the stomach was lightly adherent to the under surface of the liver by recent lymph; when separated by the hand, a perforation in the anterior stomach wall, about 1.5 to two inches from pylorus and midway between greater and lesser curvatures, was seen; it was about one-fourth inch in diameter, and gas and stomach contents escaped; the stomach wall around it was much thickened and indurated for a radius of one inch or more. The opening was closed with two tiers of black silk continuous Lembert stitches. The entire abdominal cavity was then irrigated thoroughly with a Blake tube and salt solution, and considerable turbid fluid washed from flanks and pelvis and subdiaphragmatic region. A single large cigarette drain was placed down to suture line, and the abdominal wall closed by layers except at this point, no attempt being made to drain peritoneal cavity. The usual dressing of moist bichloride and dry gauze; time, 50 minutes; condition good.

Course.—Vomited twice while coming out of ether; not at all afterwards. Temperature ranged from 100.6° to 102.2° F. during the first three days, gradually falling to 100°, the pulse ranging from 136 down to 108. Saline enemata were given for the first day; hot water by mouth in small quantities during the second

day Bowels moved by enema on second day On January 24, the third day after operation, his temperature suddenly rose to 103.4° F, pulse, 140, he was very restless, and coughed a good deal. The wound was dressed and showed no signs of infection, the abdomen was soft and the leucocyte count 9000. From this time on convalescence was uneventful, the temperature remaining below 100° F and pulse below 900 after the fifth day. The drain was removed on the fourth day and all drainage left out after the sixth day. Milk and hime water by mouth commenced on the fourth day, soft diet on the eighth day. Sat up on February 10, unineteen days after operation, and left the hospital well on February 13, twenty two days after the operation.

STRANGULATED HERNIA, WITH RESECTION OF THE

DR PECK presented a man, aged forty seven years, who was admitted to Roosevelt Hospital, in the service of Dr Robert F Weir, January 17, 1904. For twenty years the man had had a reducible right inguinal rupture. He wore a truss at intervals, and at times the herma would disappear for a year or more and be apparently cured, until some strong exertion brought it down again. Six months ago it was irreducible for two days. Patient never had any very serious illness. He is a moderate user of alcohol.

Present Illness—Eight days before admission, the rupture came down and could not be reduced. It had gradually become more and more tender and painful. Five days before admission he began to vomit with increasing frequency, and for two days could retain nothing whatever.

His vomitus had never been fæcal His bowels had not acted for five days and the abdomen was somewhat distended His gen eral condition was fairly good Locally, there was an oblique, irreducible, tender, tympanitic, inguinal hernia the size of a goosegg (on the right side) Skin not discolored over it. There was a distinct impulse on coughing, which suggested that the hernia was obstructed, not strangulated. The right testicle was not in the scrotum.

Operation, four hours after admission by the House Surgeon, Dr Whittemore Ether Incision as for ordinary Bassim The

tunic of the undescended right testicle (which lay just outside the inguinal canal) was first opened by mistake. On opening the sac a small amount of turbid fluid escaped and a loop of small intestine, four inches in length, of very dark color and slightly coated with lymph, was disclosed. After dividing the constricting band and drawing down the loop, the major portion of the gut slowly regained its color. An area about the size of a dollar at the point of constriction, however, did not recover, and after waiting ten minutes a resection was decided upon. In order to get normal intestine for approximation, about eight inches were resected. The ends were united with a medium-sized Murphy button in the usual manner, reinforced all around with continuous Lembert sutures. In order to return the button to the abdominal cavity, it was necessary to divide the internal oblique and transversalis for about an inch at their origin from Poupart's ligament. The button was left just inside the ring, and a single cigarette drain placed, leading down to it. The wound was closed, as far as practicable, according to Bassini.

Postoperative Course.—No vomiting after operation. Several enemata of saline were given for thirst in first twenty-four hours; then water was given by mouth and soon afterwards milk. At the end of sixty hours an enema was returned with a fair amount of fæcal matter. Wound dressed on fourth day and a narrow gauze tape substituted for cigarette drain. Wound closed rapidly. A cathartic was never given, his bowels remaining open with the aid of an occasional enema. Patient was kept on "soft diet" until after the escape of the button. On the nineteenth day an X-ray picture located the button in the upper pelvis, but it could not be felt, nor did high enemata bring it away. It was discharged spontaneously on the twenty-fourth day. Discharged, cured, on February 14, the twenty-eighth day after operation.

CONGENITAL DEFORMITY OF THE RIGHT LOWER EXTREMITY.

DR. ROYAL WHITMAN presented a female child, three years of age, with a congenital defect of the right lower extremity, the fibula on that side being entirely absent. As a result of this defect, there was considerable shortening, and, in order to remedy this, a surgeon who had seen the patient soon after birth had shortened the other limb by removing a section of the femur. The remedy

did not prove effective, however, for, as in all cases of this type, the shortening had been progressive, amounting at the present time to two and one half inches The chief interest in the case was the remedy that had been employed

FRACTURE OF THE FEMUR PRODUCED BY AN OBSCURE LESION OF THE BONE.

DR WHITMAN presented a young man, who came to the Hospital for Ruptured and Crippled a few weeks ago, with a resistant enlargement of the upper third of the right thigh, and about one inch shortening on that side. He stated that up to four months ago he was perfectly well. Then, without apparent cause, he began to have some pain about the right hip. This pain was severe enough to keep him in the house. About a week after its onset he accidentally kicked a chair, and immediately fell to the floor. The leg was entirely useless, and he was obliged to remain in bed for about a month. He was then able to go about the house with the aid of two sticks, and three weeks later he began to go out. In the meantime, an enormous swelling had developed over the upper part of the thigh, and when the patient was first examined the case was regarded as one of sarcoma of the femur, with spon taneous fracture. Since then, bowever, the swelling instead of increasing, has become somewhat less. An X-ray photograph was taken, which showed that the fracture had occurred in the neighborhood of the trochanter minor. There was moderate outward rotation of the limb, firm umon, and the patient walks about without discomfort.

Dr Whitman said the only way he could account for the course of events in this case was that the weakness and subsequent fracture of the bone were due to the presence of a congential cyst or to a mild form of osteomyelius. The swelling he attributed to the deformity and exuberant callus resulting from improper apposition of the fragments. The speaker said he had never seen a parallel case.

DR F KAMMERER said he did not think the diagnosis of sarconna could be absolutely excluded, because the growth had lately decreased somewhat in size. It was still rather large to be attributed to exuberant callis. In answer to a question of the President as to the nature of the growth in the bone (femur) of a case he had shown at the meeting of the Society some months ago (Annals of Surgery, January, 1904), the speaker said that on cutting down upon the femur he found a hard, fibrous mass occupying the entire medullary canal. It extended from the trochanter down to the condyles at the knee, and, after chiselling open the whole bone, the mass could be removed in large pieces. The pathologist reported that the growth was purely fibrous in character. There had been no evidences of a recurrence, and since the operation the bone cavity was gradually filling up with granulation tissue. The deformity had increased, and a secondary operation would be necessary to correct it. Sarcoma and syphilis must be excluded. The case was certainly a very unusual one. Perhaps the further course might throw additional light on the etiology.

DR. WHITMAN said the X-ray picture apparently showed an overlapping of the short upper fragment. The callous formation was exuberant, but not more perhaps than might be explained by an untreated fracture. If the case were malignant in character, such a rapid union of the bone would be very unusual. The man gave no history of syphilis, and showed no evidences of that disease; and if syphilis could induce such fragility, it would also prevent union in all probability.

INTESTINAL OBSTRUCTION FOLLOWING OPERATION FOR APPENDICITIS.

Dr. John Rogers presented a young man who was operated on for appendicitis about two years ago. On September 29, 1903, he committed some indiscretion in diet, and on the following day he vomited and passed some gas per rectum. On the following three days "bilious vomiting" continued, and the patient complained of some pain in the abdomen, but he was able to go about.

On the fifth day of the attack, when Dr. Rogers first saw him, the patient appeared fairly comfortable, but a little weak from lack of food. There were no abnormal physical signs. The mother stated that an enema had brought away some fæcal matter, and that gas had been passed. The urine was scanty. The patient's temperature was 101° F.; pulse, 125.

Because of the lack of physical signs, it was decided to postpone operative interference. During the next twenty-four hours the vomiting continued, and on the seventh day it had a fæcal odor. An exploratory operation was therefore decided on, although the belly was still perfectly soft; there was no distention, ngidity, or pain A median incision was made just below the umbilitius, and upon inspection a band was found starting at the caecum, passing upward and inward along the free border of the omentum, and constricting the jejunum transversely at a point about two feet from its origin. After dividing the band, this underlying intestine presented a ring of gangrene about one half an inch wide where it had been constricted, and it was therefore necessary to resect the gut at this point. The two divided ends were then brought together over a Murphy button. The patient made an uneventful recovery. The button was passed on the thirty-eighth day.

The case was interesting, Dr Rogers said, on account of the total absence of any local signs of obstruction, and because of the small quantity of urine secreted during the patient's illness. On the last day of his illness he did not pass any urine. This last symptom, Dr Rogers said, had been noted in a number of cases where the obstruction of the intestines was high up. In addition to all this there is of course the interest attaching to the obstruction which followed, and seemed directly dependent upon the preceding operation for appendicitis. A subsequent obstruction seems a possibility, which, though remote, is unavoidable.

Dz. Charles L. Giesov said the question arose whether the adhesive bands were the result of an operation for appendicuts or were due to the primary condition. In the latter case, they should be regarded as an additional element of danger, and emphasized the importance of the prophylactic treatment of appendicuts by operating during the quiescent stage. The speaker said that personally he was inclined to believe that the bands were the result of the appendicuts, and not the operation

DR CHARLES H PECK said that very recently he saw a case of intestinal obstruction at Roose-elf Hospital following an opera tion for appendictis. The operation, which was an interval one, had been done about a year before, and no drainage had been employed. The cause of the obstruction was an adhesive band constricting the flew. The patient was in a very bad condition, and died from the effects of the operation. Dr. Peck said this was the only case he had seen where adhesive bands causing obstruction had followed an interval operation.

Dr. John F Erdmann said be thought it was a question whether the band in the case reported by Dr. Rogers was a result

of the operation for appendicitis, or a pre-existing condition, and one of the causes that demanded the primary operation. The speaker said he had recently seen two cases of appendicitis where these bands were found, and where no previous operation had been done.

Dr. Peck said that in the case he had mentioned, the presence of the adhesive band had appeared to him to be a postoperative condition. He did not think it was present prior to the primary operation, although he was unable to make any positive statement on that point.

Dr. Ellsworth Eliot, Jr., said he had seen two cases of intestinal obstruction after interval operations for appendicitis, one six months after the primary operation, the other eight months. In both cases, the speaker said, he had done the original operation, and in one of them the secondary operation also. In the first case, which was followed by intestinal obstruction, the stump of the appendix was cauterized and dropped back, and when the abdomen was subsequently reopened to relieve the obstruction it was found that adhesions had formed to the stump of the appendix. Warned by that experience, Dr. Eliot said he had since inverted the stump; but in spite of that procedure, he had had one other case where obstruction occurred. One of his cases recovered. In the other, where the operation was done outside the hospital, the patient died. Dr. Eliot said he had heard of other cases where intestinal obstruction developed after an interval operation for appendicitis.

Dr. Lilienthal said he thought the method of inverting the stump of the appendix would invite the formation of adhesions, while simple cauterization of the stump would prevent them. In the latter case the little stump was cast off in a very few days, and with it any adhesions which might have formed. The speaker said he had had the opportunity of examining a number of those cases, and had reported his experience in a paper which recently appeared in the *New York Medical News*. He had never seen adhesions at the point where the appendix had been cut off and cauterized, and he regarded that method as safer and more rapid than the inversion method.

SOME REMARKS ON TUMORS OF THE CHIASM, WITH A PROPOSAL HOW TO REACH THE SAME BY OPERATION.

DR. Otto G. T. Kiliani read a paper with the above title, for which see page 35.

DR LILIENTHAL said that in his eapacity of chairman of the medical equipment committee of the new Mount Sinai Hospital he had investigated the subject of surgical engines, but the committee had not yet decided which one to purchase. He suggested that the handle of the instrument should be so constructed that it could be held steady, and every precaution should be taken not to lacerate the dura. With the old fashioned instrument for cutting through the skull, the breaking of the cables caused a good deal of annoy ance. In the drilling engine used by dentists, a cord and jointed arm were substituted for the cable, and this gave much better satisfaction, because it was less likely to get out of order and was easily repaired. Dr. Lilienthal said that dentists had recommended, as the best surgical engine, one devised by Dr. Cryer, of Philadelphia, a dentist. It was expensive, but very powerful and adaptable

DR KILIANI said that with the instrument he had described the fraise was of tempered steel, and cut so readily that extreme pressure upon the handle was unnecessary, in fact, it could be held almost as lightly as a pencil. There was little or no danger of muting the dura

Stated Meeting, March o, 1004

The President, HOWARD LILIENTHAL, MD, in the Chair

RESECTION OF KNEE FOR TUBERCULOSIS

DR JOHN A HARTWELL presented a negro, twenty-eight years old, who was admitted to the Lincoln Hospital in March, 1902, with the history of having had some trouble with the left knee, the condition having existed about a year. It began with pain, and went on to a typical case of tuberculosis of the knee-joint. When he first came under observation there was a large quantity of fluid in the joint and over the internal tuberosity of the thios, and the suppuration had progressed to such a degree that the bone was almost exposed.

Upon opening the joint through a transverse incision, it was found that the lower end of the femur was more or less diseased, and about one inch of the bone was removed. In the tibia the disease had extended down into the medullary canal for a distance

of fully two and one-half inches, and, as a radical operation would have necessitated the removal of at least three inches of the bone, it was deemed advisable to resect only the articular end of the tibia, scrape out the diseased tissue in the medullary cavity, and then fill it with an emulsion of iodoform. All the tubercular tissue in the capsule and in the periarticular spaces was carefully cleaned away and the lower end of the femur and the upper end of the tibia were then sutured with chromic gut. The wound discharged freely for several weeks, but finally healed entirely with the exception of a small sinus, through which a piece of chromic gut was removed about a year after the operation. Ankylosis was complete, and the patient walked with a slight limp only. In reply to a question, Dr. Hartwell said there was an inch and one-half shortening on the affected side.

INGUINOPERINEAL HERNIA.

DR. WILLIAM B. COLEY presented a man, thirty-eight years old, who was operated on in September, 1902, for this very rare variety of hernia, in which the testis and hernial sac occupied the perineum instead of the scrotum. At the time of the operation, the testis was considerably atrophied; it was transplanted into the empty scrotum, but, on account of the rather short cord, it could not be carried down into the bottom of the scrotum.

Dr. Coley said he had operated on five similar cases, in one of which the tumor was as large as a cocoanut. In three of his cases he had successfully transplanted the testis into the scrotum. All of these cases were on the right side.

FOREIGN BODY (WOVEN BOUGIE) IN RETROPERITONEAL SPACE.

DR. HOWARD LILIENTHAL presented a woman, twenty-nine years of age, who was admitted to hospital on December 1, 1903. She had been married four years, had had one child and two miscarriages. The last abortion was said to have been self-induced on July 1, 1903, in the early months of pregnancy, by means of the introduction of a woven instrument. This woven bougie, previously boiled, and used only after the patient had washed her hands and taken a douche, was said to have been inserted into the uterus and left there. The next day there were cramps and some slight bleeding, one clot of considerable size being expelled. The instrument was not found after the abortion. Menstruation ap-

peared again in October, and again in November, there having been no appearance of blood in the meantime. For five weeks after the introduction of the bougie the patient was sick in bed with chills and fever, accompanied by profuse sweating and a throbbing pain in the left side from the pelvis to the ribs, and in the right loin A swelling appeared soon after the miscarriage, occupying the left iliac region. It was quite tender to pressure The patient had been out of bed since the 17th of August, but said that she had occasional fever and rapid pulse. She had lost twenty-two pounds in weight from July I to the date of her admission. December 1

On examination, a hard mass, the size of a large fist, was felt occupying the left iliae region, and apparently adherent to the abdominal wall From the upper section of this mass, a long, indurated portion extended upward, apparently along the posterior abdominal parietes, about in the direction of the ureter, until it was lost beneath the ribs The entire mass was but slightly sensitive to pressure Examination by vagina and by rectum did not indicate close relations with the pelvic organs

The patient's general condition was very good, and there was

little, if any, abnormality of pulse or temperature

On December 5, under gas and ether an esthesia, Dr Lilienthal made an incision into the lower portion of the mass through the abdomen After penetrating to the depth of about an inch into tough, indurated tissue, he decided to perform collotomy through the same external incision alongside of the tumor Intraabdominal palpation revealed the fact that the polvic organs were perfectly free, and that the extension of the tumor upward along the line of the ureter was also absolutely free from adhesions with the viscera Apparently the instrument had not passed through the uterus, but had been forced through the vaginal fornix, and had penetrated the retroperatoneal space. The original incision into the mass was now deepened for another half inch and he came upon a hard, cylindrical body, the bougie, lying perfectly free in a tube like canal which it exactly fitted On withdrawal, the instrument, which had lost its proximal capping and was therefore open, was found to be filled with a purulent flind The bougie was a No 13 French considerably the worse for wear A rubber tube somewhat smaller than the boughe was inserted into the sinus for drainage, and the peritoneal wound closed by suture Drainage was not satisfactory, and on December 19 the patient

was again anæsthetized and a counteropening in the loin made by cutting down upon a large-headed probe passed into the sinus. A viscus, thought to be the colon, was encountered, and had to be carefully incised in order to identify it. Finding it to be indeed the large intestine, the opening was closed by silk suture and counterdrainage by tube finally accomplished. The wound in the colon broke down, so that there was for a time a fæcal fistula, and the patient also passed through a severe tonsillitis and a lobar pneumonia. The drainage was efficient, however, and all wounds closed by February 15, the patient being discharged well after a stay of two and one-half months in the hospital.

CHOLECYSTECTOMY.

Dr. F. Kammerer presented a man, twenty-nine years old, who was perfectly well until a month before the operation. He then began to complain of severe pain in the epigastrium, with chills and vomiting. He had three similar attacks during the month, the last just before his admission to the hospital, this time associated with pain in the back and shoulder. Examination showed a large tumor over the site of the gall-bladder, with all the symptoms of an acute inflammatory condition.

The gall-bladder was exposed by Robson's incision. It was found much enlarged and filled with stones. The omentum was adherent to it, especially around its tip. At this point, after separation of the adhesions, which was easily accomplished, a patch of gangrene about the size of a silver quarter was found, and in the centre of this a perforation large enough to admit an ordinary lead-pencil.

The gall-bladder and part of the cystic duct completely filled with stones were removed. Recovery was uneventful.

Dr. Kammerer presented a second patient, a woman, fifty years old, who had had several attacks of biliary colic during the past two years. At the operation the gall-bladder was found filled with stones considerably thickened and tied down by numerous adhesions. It was freed with considerable difficulty, and extirpated. A search of the common duct was then made for further stones. Palpation of the deep ducts did not reveal the presence of further stones, and a probe was passed through the cystic and common ducts apparently without encountering any resistance.

The patient recovered from the operation, but a biliary fistula remained, all attempts to force the bile into the intestinal tract failing Upon reopening the abdomen several months later at least half a dozen stones were found in the common duct, which was slit open in its entire length. Just above the papilla there was a mass of inspissated bile about the size of a finger nail

After suturing the common duct, the stump of the cystic duct was opened and drained through the old wound Unfortunately, the sutures in the common duct gave way, and for a long time there was a discharge of bile through the new incision After four or five months both wounds finally closed

Dr Kammerer said that in this case the stones in the common duct were evidently overlooked at the first operation, in spite of a fairly thorough search and probing

PRIMARY CHOLECYSTECTOMY SCOPE, METHOD AND RE SULTS, CONCLUSIONS FROM FORTY TWO CASES IN THE PRACTICE OF THE AUTHOR

DR HOWARD LILIENTHAL read a paper with the above title, for which see page 44

DR CHARLES L GIBSON said it was scarcely four years ago when he presented the first case of primary cholecystectomy that had ever been shown at a meeting of this Society, and at that time Dr Lilienthal rather opposed the operation Since then, appar ently, he had gone almost to the other extreme, and the tone of his paper was so optimistic that it gave one the impression that cholecystectomy was not only as safe, but safer than ordinary cholecystotomy If that interpretation of Dr Lilienthal's paper was correct. Dr Gibson said he would take issue with him. He did not regard the actual removal of the gall bladder as innocuous an operation, or less so, than one consisting of simple drainage of the gall bladder Theoretically, cholecystectomy possessed the advantage of removing the focus of infection of doing away with the possibility of a mucous or biliary fistula, and of a recurrence of pain due to adhesions A persistent fistula after cholecystectomy meant an incomplete operation

Under certain conditions, Dr Gibson said, the operation of cholecystectomy was certainly indicated, but it should not be undertaken unless some definite object was to be accomplished by it. Simple drainage of the bihary passages could be done perfectly well by cholecystectomy without opening the lower duct, by leaving the cystic duct open.

The reader of the paper mentioned hæmorrhagic diathesis as

a contraindication to the performance of cholecystectomy. While this was so theoretically, it would also apply to cholecystotomy. The speaker said he had seen two patients succumb to hæmorrhage after simple drainage operations on the gall-bladder.

DR. WILLY MEYER said that during the past twelve years. when he first took up gall-bladder surgery, he had done more cholecystostomies than cholecystectomies, and the results of the former operation, so far as a recurrence of the colicky pains, etc., was concerned, were extremely satisfactory. On two occasions he had opened the gall-bladder, taken out the stone, and immediately closed the wound. In both of those cases the patients got well, but the speaker said he did not favor the operation. At present he was also opposed to the performance of cholecystectomy in every case of gall-stones. He recalled two instances where the operation was followed by a recurrence of the colicky pains; there was no recurrence of the jaundice, but the pains were more severe than he had ever seen after cholecystostomy, and were attributed to the formation of adhesions. In every case, however, where the gallbladder was thickened or materially changed in appearance, it ought to be removed. The speaker recalled a case where he had operated for acute empyema and did not add extirpation of the bladder on account of the patient's serious condition. Recovery was uneventful. Three months after the wound had definitely closed, a small, hard nodule was noticed in the scar, which at once impressed him as being malignant in character. A carcinoma of the abdominal wall developed, which evidently had begun in the wall of the gall-bladder. Patient was later operated by another surgeon and died soon after.

Dr. Kammerer said that during the past fourteen years, since the publication of Courvoisier's classical work, he had been operating on cases of cholelithiasis, and had never seen a case of recurrent gall-stones. When changes in the gall-bladder were found at operation, a primary cholecystectomy was indicated, as Dr. Meyer had already stated, because it was a well-established fact that patients with carcinoma of the gall-bladder generally had gall-stones. The macroscopic diagnosis of carcinomatous degeneration of the gall-bladder or of the ducts during operation was frequently impossible, and it was, therefore, better in such instances to remove the organ, when the appearance of the latter was not normal. Personally, the speaker said, he was opposed to primary cholecystectomy in every case.

DR. GEORGE E. BREWER said that Dr. Lilienthal, in his paper, did not advocate removal of the gall bladder in every case of cholelithiasis, and the indications he gave for removal of the organ were very definite Dr Brewer said he would go even a step farther than the reader of the paper and advise the extirpation of every gall bladder that had been rendered functionless, or the walls of which were thickened or changed in appearance, or one in which the cystic duct was obstructed Another indication for removal of the gall bladder was where a stone was found impacted in the pelvis of the organ, because mere removal of the stone in such a case usually resulted in absolute stricture A gall bladder containing purulent fluid should always be removed, otherwise, an infected cavity was left which would later cause trouble Dr Roswell Park had made the assertion that we should remove the gall bladder as we would the appendix, that, like the latter organ. it was a relic, and of no particular use to the individual Dr Brewer said that where we had a gall bladder which was not in direct connection with the duct system, or which was the seat of inflammation, it ought to be removed. If there were any indications for removal of the gall bladder, it should be done at the primary operation A secondary cholecystectomy was difficult, and the operation should be compared, in difficulty, to a secondary nephrectomy after suppurative disease of the kidney

DR JOHN B WALKER said that he also had seen two fatal cases from persistent oozing after operation on the gall bladder. The speaker agreed with Dr Lihenthal that in those cases where the rall bladder was in a gangrenous condition the cistic duct

should not be closed

DR L W HOTCHLISS said that personally, in his work on the gall bladder, he had been rather conservative in the choice of cases for removal of the gall bladder. He spoke of the desirability, and necessity often of draiming through the cut cystic duct in certain acute cases after cholecystectomy, and said that, instead of suturing it, he had clamped and cut it, and drained to the site with a rubber tube drain submerged by a moderate gauze packing, and allowed it to heal by granulation

DR E LIBYAN (b) invitation) said that the usual impression was that bacterizemia was very common in cases of gall bladder disease and appendicitis. In his experience it did not occur very frequently. In appendicitis it must be very common. These observations were confirmed, he believed, by the fact that metastatic

dépôts in the joints, in the subcutaneous tissues, or in the viscera apart from the liver and lungs almost never occurred in such cases. It seemed that in some of the cases of disease of the appendix or liver the progress of the infectious process was stopped in the liver or in the lungs. And in some of these cases, while there might be bacteria in the blood current between the focus and the lungs, none were found in the peripheral circulation. Of course, in fatal cases, general ante-mortem invasion might occur.

To the cases in which bacteria were not found in the peripheral veins and the lungs were found to contain metastatic foci, Dr. Libman said he applied the term "non-systemic or partial bacteriæmia."

Dr. LILIENTHAL, in closing, emphasized his belief that any gall-bladder that was bad enough to be operated on ought to be removed. Even in a case of uncomplicated cholelithiasis, with multiple stones, in which operative interference was demanded, a cholecystectomy was preferable to a cholecystostomy, and less dangerous and difficult than the latter operation. He saw no reason why such a gall-bladder should be allowed to remain and make trouble later on. If the gall-bladder was thickened and there were gross macroscopical changes, it certainly should be removed, because it was prone to become the seat of malignant degeneration.

In dealing with cases of cholelithiasis, one could never tell how long the stones had been in the gall-bladder, nor could the condition of the interior of the organ be determined by mere inspection of its exterior. Such a gall-bladder might possibly be gangrenous all the way through to the serosa, and this fact would never be disclosed by any operation short of cholecystectomy. That the mortality of the operation was low was shown by the fact that he had only had one death in forty-two cases, many of whom were in a very desperate condition at the time of operating, with high temperature, sepsis, etc.

Dr. Lilienthal said that all of his forty-two cases were not operated on through the rectus incision; only the last twenty-five or thirty were done by that method, which he regarded as very satisfactory. The incision could be made as long as was necessary, although he had usually found four inches long enough.

Dr. Lilienthal said that Dr. Kammerer's second case, in which a number of stones in the common duct were overlooked, was an extremely interesting one. In order to prevent the possibility of leaving stones behind, the speaker said he first put in a retraction suture through the cystic duct underneath the clamp, and then, after dividing the duct, he tied off the cystic artery, which could be done very easily With that danger of hamorrhage out of the way, the operator could make a thorough search, and if there was any trouble afterwards, it was due either to the presence of adhesions, or to a re-formation of stones, or to something that could not have been avoided. It was certainly not due to the cholecystectomy. Although cholecystectomy was the most radical operation that could be done on the gall bladder, he did not consider it any more dangerous than appendicectomy nor cholecystotomy. If the case was a simple one, neither operation was dangerous, while if it was a serious case, cholecystectomy was less dangerous than cholecystotomy.

In answer to the question whether he would leave the cystic duct unted in acute cases, Dr Libenthal said he thought that precaution would be unnecessary if the duct looked normal, with out showing any evidence of gangrene, and if there was no cholangeits. If the latter condition was present, he would leave the duct unted. If the common duct was perfectly free, it furnished a natural and proper method of drainage into the bowel. If a good sized probe could be passed through the cystic duct, there would be no necessity for slitting the common duct.

Dr. CHARLES L GIRSON related the history of a woman who was first operated on by another surgeon for empyema of the gall-bladder in 1901. She came under Dr. Gibson's care early in 1903, and was operated on by him on January 16 of that year. She then had a discharging sinus as the result of the previous operation. Upon excising the sinus and exposing the gall bladder, the latter was removed and found to contain a gall stone of considerable size and a small strip of iodoform gauze. The gauze was not in the gall stone, but wrapped around it. The gall stone in this case, Dr. Gibson said, had formed inside of two veries.

INTESTINAL OBSTRUCTION FROM ADHESIONS DUE TO EMPLEMA OF GALL-BLADDER, SPONTANEOUS DIS CHARGE OF THE SLOUGHING GALL-BLADDER.

Dr. Girson presented a specimen taken from a woman of fifty-mine, who entered the hospital in September, 1903, complaining of symptoms of intestinal obstruction which had been present for four days

Some features of the case excited the suspicion of gall-stones

On opening the abdomen, the obstruction

was found to be due to an inflammatory mass composed of omentum and infiltrated intestine occupying the region of the descending colon. Upon inspection of the gall-bladder, it was found to be filled with pus and a number of large stones. These were removed and the gall-bladder drained. An artificial anus was made in the cæcum, and in the course of a few days the inflammatory condition in the region of the descending colon subsided, and ten days later the patient began to have some movement by the bowels. Her convalescence was interrupted by the onset of some acute illness, and it was four months before the artificial anus finally closed. Two weeks after the original operation, a sloughy mass presented in the wound, which was identified as the necrotic gall-bladder.

CHOLECYSTOTOMY.

Dr. Otto G. T. Kiliani presented specimens of gall-stones removed from a woman twenty-four years old, whose family and previous history presented no interesting features. Five months ago she began to complain of pain in the epigastrium, with vomiting, diarrhæa, jaundice, and chilly sensations. The jaundice persisted three days. These attacks recurred each month with increasing severity, the last one occurring two weeks ago. The stools during these attacks were lighter in color than usual.

Operation, February 24, 1904. A four-inch incision through the right rectus muscle revealed a normal looking gall-bladder. This was opened, and several stones of the mulberry type were removed. The gall-bladder was immediately closed with two layers of silk sutures. The abdominal wound was also closed, with the exception of a small gauze drain leading to the gall-bladder.

CHOLECYSTECTOMY.

DR. KILIANI presented specimens removed from a woman who, upon her admission to the German Hospital on March 2, 1904, was so sick that no history was obtainable. She was operated on the following day by Dr. Kiliani. The gall-bladder was found much thickened and enlarged, and about to perforate at its base. It was incised and two large and several small stones removed. Cholecystectomy was then done and the cystic duct closed with chromicized gut. The wound was drained to the stump of the cystic duct and the surface of the liver, where the gall-bladder had been adherent. The outer wound was closed, excepting for drainage.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, March 7, 1904

The President, HENRY R WHARTON, MD, in the Chair

THE ADVANTAGES OF ABDOMINAL OVER VAGINAL HYSTERECTOMY IN CARCINOMA

DR JOHN B DEAVER said that he saw a large number of cases of uterine carcinoma each year, many of which have passed beyond the stage for operation Unfortunately, many of the subjects of this disease suffer from symptoms not at all well defined, are free from pain, and have but little discharge until the growth has become so extensive as to forbid radical interference, for this reason the family doctor is often unaware of the real nature of the disease until it is too late to resort to surgical interference

Irregular bleedings from the uterus, whether before, during or enter the menopause, should excite the apprehension of the general practitioner, as well as the surgeon, to investigate, at any rate. It is absurd to consider feelings of delicacy and allow them to prevent an inspection of the cervix and palpation of the body of the uterus, nor in doubtful cases fear of consequences deter resort to curettage with examination of the scrapings. Negative findings by the pathologist should be accepted with great reserve and not be allowed to controvert unmistakable chinical symptoms, especially in women approaching or past the menopause. He emphasized the latter, because, as is well known, epithelioma rarely begins until after the child bearing period.

The differentiation between hamorrhagic endometritis and commencing maligant disease is not always possible, in fact, it is the practice of the writer, in those cases of hæmorrhagic endometritis occurring about the change of life with a large and flabby uterus and family history of malignancy, to make a complete removal of the uterus.

In hæmorrhagic or hypertrophic endometritis with foul-smelling discharge, the uterus should be curetted and the findings examined microscopically. A negative finding does not necessarily prove the absence of carcinoma, as the curette may have escaped the cancer area, or the carcinoma be within the uterine muscle. Excision of a small portion of the uterine tissue for microscopical examination can only be considered where the disease is of the cervix.

The class of cases of carcinoma of the uterus which perplex the surgeon most in determining what is best to do are those which are not seen early; when it is questionable whether the tissues outside the uterus are involved, rendering it difficult to determine even the propriety of radical interference. The most common site of carcinoma of the uterus is the cervix, which is usually squamous-celled, and early in the disease is essentially a local process, hard and indurated, with papillæ elevated from the surface of the mucous membrane. These papillæ increase and enlarge, giving rise to the cauliflower-like growth so often seen; ulceration and necrosis soon follow, implicating the vaginal vault, the broad ligaments, the bladder, and rectum. When the case has assumed this stage radical treatment is, as a matter of course, not to be considered. One of the important questions to be decided in the operation for radical cure of carcinoma, be it situated in the uterus or elsewhere, is, Can the excision of the cancer area be performed by section through normal tissue?

For the relief of the discharge, the bleeding, or the pain in advanced carcinoma of the uterus, local measures, as the curette and cautery, are more efficacious than the use of the knife. The most careful bimanual examination must be made to determine the advisability of radical operation, also must the patient's general condition and the absence of other organic lesion be favorable. The radical operation is, in the speaker's judgment, only to be considered in the early stages of the disease. He had found that the pain consequent upon the recurrence of carcinoma following late and extensive operation is greater than in cases of the kind which have been curetted and cauterized.

The speaker practises and strongly advocates total ablation of the uterus by the abdominal route in early carcinoma of the cervix. He felt sure this operation promised more, both immediately and ultimately, than does the removal by the vaginal route. In the early stages complete removal of the uterus, broad ligaments, and the lymph channels in the latter, with possibly the iliac lymph glands in some cases, should guard against recurrence with reasonable security.

It is interesting to note that Professor Jacobs, of Brussels, one of the earliest advocates of vaginal hysterectomy for cancer of the uterus, has entirely changed his views, and now only does the vaginal operation when the abdominal route is impracticable Jacobs states that he never has had a case of uterine cancer oper ated upon by the vaginal route to live more than three years, and that the majority of them were dead at the end of one year. In contrast to this he has a number of cases, upon which he operated by the abdominal route, that are living and well after four years Jacobs practises the removal of the pelvic glands.

Professor von Rosthorn, of Heidelberg also practises cleaning out of the glands of the pelvis in carcinoma of the uteriis, in fact, this is the common practice at the present time on the Continent. It would seem as reasonable to remove the glands of the pelvis in connection with removal of the uteriis in early carcinoma as it does to remove the glands of the armpit in early operation for the removal of cancer of the mammary gland. It scarcely seems necessary to say that this is a useless procedure where there is afready systemic involvement. The Halsted operation for carcinoma of the mammary gland, as practised by Dr. Deaver, is only done in the early cases. It is useless to make so extensive a dissection after there is advanced involvement of the axillary, subsection after there is advanced involvement of the talter condition is present, it is evident that the disease has advanced beyond the reach of the surgeon's kmife, particularly in the shape of involvement of the intrathorace glands.

He strongly opposed vaginal hysterectomy in carcinoma of the cervix, except in the presence of obstacles necessitating such a course, for instance, a very stout abdomen, nephritis, etc. Early carcinoma of the fundus of the uterus is the condition in which he practised vaginal hysterectomy, and not in the cases where sufficient time has elapsed to have allowed the lymphatics of the cervix utern to have become involved. The vaginal operation in carcinoma of the cervix offers no advantages over abdominal section when the latter is properly performed, and suffers from the charge of being an incomplete procedure, dangerous to the ureters, and liable at any time to be followed by secondary bleeding. The abdominal operation certainly gives the only chance for the proper cleaning of the pelvis, offers greater security against hæmorrhage and less risk of injuring the ureters; the field of operation is kept constantly in view, the patient in the Trendelenburg position, and the intestines kept out of the way of injury and infection by the proper placing of gauze pads. That we can cut farther away from the diseased area in the abdominal than in the vaginal operation, we must admit.

In the abdominal operation, he never had any fear of injuring the ureters if the bladder with the anterior serous flap was carried well forward and upward behind the pubic bone. If the operator is not content with this, it is a simple matter to expose the ureters. The introduction of ureteral catheters or bougies to safeguard the ureters had not been his practice. He had always feared more the consequences of carrying an instrument from the bladder into the ureters and exposing the kidneys and ureters to the danger of infection than injury to the ducts.

He was an advocate of dissection of the lymphatic glands of the pelvis in all cases of carcinoma. He did believe, however, that in certain selected cases this operation is not only feasible, but in order. In this connection he furthermore said that the dissection of the pelvis should be done as readily, the conditions requiring it, as a deep dissection of the neck; the same amount of care in exposing the lesion and the structures in relation therewith, thus avoiding unnecessary mutilation, should be carried out in the same anatomical manner as in the dissection for the removal of an enlarged thyroid gland. This being done, fewer ureters will be injured, fewer cases of secondary hæmorrhage, of postoperative vesical fistula, intestinal fistula, etc., will have to be noted. The individual ligation of vessels of any size as opposed to the mass ligature or the use of that abominable instrument, the angeiotribe, be it the plain or electrical hæmostatic instrument, he strongly urged.

In connection with the discussion of the propriety of the removal of the pelvic lymph glands, it is interesting to note that

the lymphatic system of the uterus is composed of a rich network of vessels, those from the vagina and lower portion of the cervix following the uterine vessels to glands at the bfurcation of the common iliac arteries, usually three in number, whence they pass upward. The lymphatics of the body of the uterus anastomose with those of the cervix uteri, travel downward to the deep in guinal glands by way of the round ligaments, and pass through the utero ovarian ligament, emptying into the lumbar glands Notwithstanding these abundant lymphatics, carcinoma of the uterus spreads more rapidly by continuity of tissue than through lymphatic metastasis, therefore, the argument in favor of removal of the pelvic glands is weakened. Certainly the only cases that promise anything are those where the glands have not yet become involved. Experience teaches that extension of the cancer downward into the vagina and backward into the rectum is much more common than metastasis into the privic glands.

Epithelioma of the vagina has been overlooked as a point of metastasis or implantation, the diseased area resembling so much an excornation and has been mistaken for such believed to have occurred in preparation for operation. Early involvement of the bladder may be recognized only by means of a cystoscopic examination.

The technique of the abdominal operation is comparatively simple. The abdomen opened through the right rectus muscle, the contents of the pelvic cavity palpated to determine the presence of adhesions, and if the disease has extended beyond the uterus, the patient is placed in the Trendelenburg position, the intestines and great omentum are protected by gauze pads carefully placed. With the gauze pads properly placed the field of operation in the pelvic cavity is well exposed. Traction is now made upon the fundus of the uterus, drawing it upward and backward, when an incision is carried from the pelvic end of one round ligament to that of the other, and through the serous covering of the anterior surface of the uterus at the point of reflexion of the peritoneum from the uterus on to the bladder. This serous flap is displaced downward carrying the bladder with it, the dissection is carried as far down as possible, in this wise displacing the bladder upward behind the pelvic bone, thus exposing the anterior wall of the vagina and carrying the uterers out of harm's way. The next step in the operation is tying off the ovarian arteries to the outer or

inner side of the ovary or ovaries, depending upon the advisability of removing or leaving them. It is his practice to leave the ovaries in cases of carcinoma occurring in early life. The uterine arteries and veins are next exposed as they pass from the side of the pelvis to the cervix uteri and tied between two ligatures and divided; in making the dissection to expose these vessels the ureters are exposed, and thus rendered less liable to injury. The next step in the operation is cutting the cervix out of the vagina with the removal of the organ. The vaginal walls are now whipped over with a continuous catgut suture, a piece of iodoform gauze placed in the vagina allowing a small portion of it to protrude into the pelvis, when the anterior serous flap is brought over the protruding gauze and stitched to the posterior surface of the vaginal wall or the serous covering of the sigmoid flexure, as the case may be. The gauze pads removed: the intestines and great omentum placed in normal position; the abdominal walls closed with tier suture; the abdominal wound dressed and an aseptic dressing applied to the vulva, and the patient returned to bed. The head of the bed is elevated, unless there are symptoms of temporary shock, when this is not done until the patient has recovered from shock.

In making a vaginal hysterectomy, he preferred to use clamps rather than ligatures.

DR. WILLIAM J. TAYLOR said he agreed in every particular with the statements made by Dr. Deaver. He had performed his last vaginal hysterectomy. In the last patient upon whom he did this operation, for a malignant growth of the uterus, it was followed by infection, with a resulting peritonitis. The peritonitis was followed by embolism and dry gangrene in the right forearm that necessitated amputation above the elbow. The patient left the hospital minus not only her uterus but also her right forearm; this result occurring in spite of the fact that all possible care was used in the operation. It decided Dr. Taylor against further use of the vaginal method.

DR. DEAVER said that Dr. Taylor was fortunate in that his patient did not lose her life. His brother had an experience with a similar condition, but his patient died. She was a large, stout woman, and during the operation her limbs were held by assistants. They did what residents are prone to do,—use the limbs as a hammock and go to sleep,—and as a result of the excessive flexion during a long operation thrombosis, gangrene, and death occurred. The case demonstrated that assistants should be awake.

LOOSE BODY REMOVED FROM THE KNEE JOINT

DR HENRY R WHARTON reported the case of a man, aged fitty years, who was admitted to the Presbyterian Hospital January 19, 1903, with the following history Early in November he wrenched his right knee, but, although the knee gave him some pain, he was able to continue his work. Shortly after the accident he began to suffer with occasional pain and disability in the right knee, and experienced a sensation as if something had slipped out of the joint upon certain motions of the joint. In December the symptoms became aggravated, so that at times when walking the body slipped out of the joint, produced intense pain, and caused the knee to give away under him, so that he would fall. He became so uncertain in his movements that he was compelled to give up his work. There would often be intervals of several days when he suffered from no displacement of the body.

After his admission to the hospital, upon certain movements of the joint he was able to bring the body out of the joint, so that it could be located, when the joint was flexed, near the inner edge of the natella

After the body had been located, it was fixed by a needle passed into it through the skin, and a firm compress was also applied above it to prevent its shipping back into the joint. The patient was then anaesthetized and an incision made through the skin over the body, and it was removed. It proved to be a bony body, convex upon one surface, partially covered with cartilage and about the size of a Lina bean. The wound was closed by two layers of sutures, and the joint fixed by a plaster of Paris bandage. The superficial sutures were removed upon the tenth day, and the wound was found head.

The etology of loose or movable bodies in the knee joint is not defautely settled. Their presence is attributed by various authorities to detached synovial fringes, which remain free in the joint, or to detached osteophytes, or to the detachment of portions of bone or cartilage from a wrench or twist of the joint, or the detachment of a portion of the articular surface of the bone or cartilage by a quiet necrosis without suppuration. Fibrous bodies are said to frequently result from the organization of blood clots following injury of the joint. The body may be entirely loose, or attached by a long or short pedicle. The bodies vary in size from a pea to a body an inch or more in diameter, and may be earth

laginous, fibrous, or bony in structure. The symptoms vary in intensity, and may disappear at intervals, and appear to be due to quiescence or mobility of the body. Fixation of the joint occurs at intervals, as the body occupies certain positions in the joint. Nausea when the body becomes displaced is not an uncommon symptom in many cases. The presence of the body sooner or later causes disability and weakness of the joint from chronic synovitis, with stretching of the ligaments.

The most satisfactory treatment of this affection is the removal of the body by incision. It is wise, however, not to attempt to remove the body unless it can be definitely located, as it may be difficult to find even after an extensive exposure of the kneejoint. The operation, with careful aseptic details, is accompanied by little risk.

DR. JOHN B. ROBERTS said that he once undertook to remove what was thought to be a movable body from the knee-joint and was surprised to find that it was an osteoma or osteophyte on the femur. The fascia slipping over this gave the sensation of a movable body. The treatment for both conditions being the same,—removal,—the mistake in diagnosis was not of importance.

DR. James K. Young mentioned two cases that he recently had seen. One, under the care of Dr. Willard, was in an athlete from whose knee the loose body was taken out in two pieces, the tissue being cartilage. The second case, under his own care, is in a woman of fifty years. In this instance the movable body, which is larger than those usually found, is situated above and internal to the patella. The patient has not as yet been operated upon.

DR. W. BARTON HOPKINS said that he had seen in the laboratory of the Pennsylvania Hospital several loose bodies that recently had been taken from the knee-joints of an aged colored man who died in the medical ward of that institution. The largest concretion measured $6\frac{1}{2}$ by $4\frac{1}{2}$ by $2\frac{1}{2}$ centimetres and weighed fifty-five grammes. The two smaller concretions in the right knee-joint were not measured or weighed. It was mainly fibrocartilage, but had a small bony nucleus.

DR. GEORGE G. Ross mentioned a case which illustrated a point made by Dr. Wharton regarding the difficulty of securing a loose body that has not been accurately located or anchored before opening the joint. In this instance the body could not be found until the finger was introduced and the joint explored. Fortunately, infection did not follow this manipulation.

FRACTURE OF SPINE, ACCOMPANIED BY AN ENORMOUS
PROSTATIC CALCULUS WITH PYONEPHROSIS, AND
FINALLY A CINSHOT FRACTURE OF THE SKILL.

FINALLY A GUNSHOT FRACTURE OF THE SKULL.

DR W BARTON HOPKINS presented the following outline of

the history of this case

M S, aged twenty eight years (?), born in Germany, was admitted to the late Dr J M Da Costa's ward in Pennsylvania Hospital, January 6, 1899, with pneumonia The evening of his admission he became wildly delirious, requiring restraint in bed Later on he succeeded in slipping his straps, jumped out of the window, and fell upon the grass, a distance of fifteen feet

On being brought back into the hospital he was found to have sustained a fracture of the lower dorsal or upper lumbar vertebra, accompanied by complete paralysis from the waist down. The shock of the injury in conjunction with his serious illness rendered his condition desperate. Note of the physical signs of his chest showed pneumonia of the right lung. His breathing was rapid and shallow and he was much shocked. He slowly reacted, and at the end of a week his general condition having improved, Buck's extension apparatus was applied to both legs and counter-extension to the head, but a fortingfit later, there being no benefit from the latter, it was removed.

In six months his general condition had very much improved, but the paralysis remained unchanged

Having had occasional attacks of hæmaturia, the presence of vesical calculus was detected about this time. From then on the urine contained blood and pus, varying in quantity but always present. About this time (1901) the patient was able to sit up in a wheel chair, thus reheving the pressure over the bed sores which were present. His flesh was good and he was strong and able in his upper extremities. A pair of adjustable crutches was upplied to the chair so that he could elevate and lower them, and thus take more or less weight off of his buttocks. In this way not only were the bed sores made to heal, but his ability was much increased to wheel himself out of doors, and thus obtain exercise and fresh air.

His mental state was generally quiet and contented. The stone which was thought to be resical, but proved post-mortem to be prostatic, had increased enormously in size, and the urine contained large quantities of pus, but he obstinately declined to be relieved by operation. January 26, 1904, his stomach gave out, and this apparently being the last straw, he became hopelessly despondent, and four days later, obtaining a pistol, shot himself in the right temple and died in about ten minutes.

An autopsy was made January 30, 1904, by Dr. Longcope, who has furnished the following notes:

The body is that of a young man 163 centimetres in length. Rigor mortis absent. Body still warm. There is very slight postmortem discoloration over back and shoulders. Pupils equal and dilated. The upper extremities, neck, and thorax show a moderate grade of muscular development. Below the umbilicus there is The pelvis and lower extreme emaciation of all the muscles. extremities are almost literally skin and bones. The abdomen is scaphoid, and the anterior superior spines of ilium stand up prominently. The circumference of the middle portion of right thigh is seventeen centimetres; on the left side it is seventeen and onehalf centimetres; about the middle portion of right tibia, fifteen and one-half, and left, fifteen centimetres. The feet are in talipes equinovarus position. There is no ædema of lower extremities. Penis is small. There is a narrow band covered with skin which goes from prepuce to glans on dorsal aspect of penis. Over the tuber ischii there are purple splotches, and over the sacrum the skin in places shows shallow ulcerations.

In the right temporal region, six centimetres above the zygoma and in a line with the middle of this bone, the hair for an area of two and one-half centimetres across is matted with blood. Around the margin the hair is singed. The tip of the ear is blackened, and there are black marks at the outside of the supraorbital ridge. In the centre of the area where the hair is clotted with blood a small, ragged, round hole one-half a centimetre in diameter is found in the scalp.

Muscles are pale.

Abdominal Cavity. The omentum is pale, delicate, and has very little fat, but covers the intestinal surfaces well. Peritoneal surfaces are smooth and glistening. Appendix measures twelve centimetres in length, lies behind the cæcum, and is patent throughout.

Thorax. Lungs collapse upon removal of sternum. On left side the lung is bound down to thoracic wall by old fibrous cobweb adhesions. On the right side the pleural cavity is free from fluid

and adhesions Pericardial cavity contains a small amount of clear straw colored fluid, serous surfaces are everywhere smooth and glistening

Heart Weight, 200 grammes The heart is of medium size, epicardium everywhere smooth and glistening and contains some fat The right side is distended with firm red and white postmortem clots. All the valves are thin delicate, and normal. The endocardium is slightly thickened over left ventricle. The heart muscle is firm and brownish gray in color. Left ventricular wall averages from ten to fifteen millimetres in thickness. The aorta shows some slight sclerosis. Walls of coronary arteries are thicked, but the arteries are patulous.

Lungs The left lung is rather small, soft, and crepitant throughout The surface is dark purplish blue mottled with black On section, the cut surface is everywhere pale pink, soft, and crepitant Bronchi at the root contain a small amount of mucus Vessels are clear. The posterior part of pleura is covered with old fibrous adhesions.

The right lung is exactly like the left, the pleura being everywhere smooth and glistening

Spleen Weight, 190 grammes Size, 13 by 8 by 5 cents metres The capsule is delicate, smooth, and free from adhesions The color is dark purplish brown Consistency not decreased On section, the cut surface is smooth, somewhat mottled brown, and red Malpighian bodies are of medium size Trabeculæ are not increased

Liver Weight, 1220 grammes Stze, 21 by 17 by 9 centimeters. The liver is rather small, not uncreased in consistency, regular, smooth, and dark purplish brown in color. The capsule is free from adhesions. On section, the cut surface is smooth and brownish in color. Lobules are fairly well marked, their centres are small and reddish. Portal connective tissue not increased Bile duets patent. Gall bladder apparently normal.

Urmary bladder, ureters, and kidneys removed together While the bladder is being removed, a large concretion escapes from the prostatic portion of urethra which has been cut through On opening the urethra and bladder the solid portion of prostate has entirely disappeared, instead of a gland there is a large, thinwalled sac which contained the concretion, and apparently surrounded it completely

The stone is rather soft and crumbling.

It is quite regular in shape and looks as if moulded into the form of a large prostate. It is divided into three or four more or less well-defined lobes and presents a general heart shape, the apex pointing towards the neck of the bladder. On the under surface there is a rounded depression about one centimetre in diameter, into which fits the verumontanum. At the base the stone measures six centimetres in diameter, at apex, three centimetres. It is six centimetres in length and four and one-half centimetres in thickness at the base. At the anterior portion of base there is a rounded mass about two centimetres in diameter. This ends in a round process with a broken end. This process is apparently a cast of the membranous urethra. A second tip-like process extends from the superior lobule into the neck of the bladder. The wall of the sac containing the concretion is gray in color, and is covered with much pus and some mucus. The verumontanum is about the size of a cherry-stone. The ducts leading into the seminal vesicles are patent. Neck of bladder rather small. On opening the bladder the cavity is small, and is entirely filled with a thick, stringy, yellow pus having a rather foul odor. A few masses of calcareous material are also found.

The wall of the bladder is much thickened and the organ is very small; wall measures in places one and one-half centimetres in thickness. The mucous membrane is corrugated, thickened, and red in color. There are some adhesions about the seminal vesicle. Both ureters are distended to the size of one's thumb, and on pressure the ureteral orifices, which are difficult to find, are marked by a spurt of yellowish pus. The intravesicular portion of both ureters is very small and shows some actual constriction, for it is difficult to get even a small probe through the orifice. When the ureters are opened the stricture in the bladder wall is very noticeable, above this the ureters are dilated into tubes about two and one-half centimetres in circumference. The wall is thickened and the mucous membrane is very much reddened. Both ureters contain thick yellow pus. The dilatation continues up to and into the pelves of the kidneys.

The left kidney measures 13½ by 7 by 5½ centimetres. The kidney is very large and very soft, having almost a fluctuating feel. It is somewhat irregular in shape. The capsule strips readily,

leaving a fairly smooth but lobulated surface, which is mottled purple red and gray

It is dotted with irregular opaque yellow points and areas which measure from one to ten millimetres in diameter. The largest ones are quite soft. On section, the pelvis and many of the calvees are enormously dilated, and all are filled with stringy yellow pus At times the dilated spaces reach within one and onehalf centimetres of the surface, in which event the kidney sub stance appears as a gray or red line destitute of normal markings and dotted with vellow points. In other places the cortex and medulla vary from one to three centimetres in thickness. In these portions the medullary pyramids are swollen, reddish, and ill de fined from the cortex The cortex is very irregular, it measures from five to ten millimetres in thickness. Sometimes the true are fairly well marked and the glomeruh stand out as red points. In these areas the cortex has a general red look. In other places the markings of the cortex are lost, and the kidney shows extreme red and vellow mottling, while opaque, vellow streaks extend from the medullary pyramids into the cortex. The wall of the pelvis and calvees are much thickened, reddened, and in places covered with soft vellow material

The right kidney measures 13 by 12 by 5½ centimetres It is much softer than the left, has a more nodular appearance, and feels much like a thick walled cyst The surface is paler, and shows many more of the soft yellow areas On section the pelvis and calyces are so much dilated that very little of the kidney substance remains, and almost none that retains its normal markings.

Many of the calyces end in abscesses, the wall of which reaches within two or three millimetres of the surface and is covered with thick, tenacious, yellow pus Adrenals are apparently normal Pancreas, stomach, and œsophagus apparently normal Intestines are apparently normal

Auria fairly smooth

Testes are apparently normal but rather soft

The spine from the sacrum to the fourth cervical vertebra is removed en masse. At the level of the twelfth dorsal or first lumbar vertebra there is a slight deformity. The body of the last dorsal vertebra is small and compressed, and the spine curves somewhat forward and to the left side. Over the lamina there are bony exostoses which fill almost entirely the space between the

spinous processes and lateral processes. On sawing through the laminæ and exposing the cord it is seen to be rather small, except just beneath the deformity, where there is a hard, irregular swelling about the size of one's thumb-nail. Here the dura mater is adherent to the bony canal.

Brain. The skull immediately beneath the wound in the scalp shows a ragged round opening two centimetres in diameter. On the inner surface of the temporal bone the inner table is somewhat torn. There is extensive hæmorrhage beneath the dura mater and also beneath the pia mater in places. Corresponding to the hole in the scalp and dura beneath it there is a large tear in the substance of the brain which involves the fissure of Sylvius about four centimetres anterior to the foot of the fissure of Rolando. About it there is an extensive hæmorrhage beneath the pia mater. In the superficial portion of the laceration, a piece of bone two centimetres in length, one centimetre in width, and one-half centimetre in thickness together with a small mass of lead is found. On the median surface of cerebrum a second laceration is found midway between the fornix and the surface of cortex and five centimetres back of anterior point of fornix. The falx cerebri is perforated by an opening one centimetre in diameter, the perforation corresponding exactly with the situation of the laceration in cerebrum. The left hemisphere shows two lacerations, one on the inner surface and the other on the cortex; they are only two and one-half centimetres apart. Embedded in the brain substance on left side just below the pia mater there is a small piece of lead; it lies in the foot of the postcentral lobe one and one-half centimetres above the fissure of Sylvius.

Anatomical Diagnosis. Double pyelonephrosis; chronic cystitis; calculus of prostatic urethra; old fracture of last dorsal and first lumbar vertebræ; laceration of brain by a leaden bullet.

Dr. John B. Roberts described briefly a similar case upon which he recently had operated. The patient had attempted suicide and was unconscious when seen. Marked exophthalmos was present; it being readily surmised that the bullet had passed just behind the orbits and that the cavities were probably filled with blood. The skull was trephined at the point of entrance of the bullet and fragments of bone and a great deal of blood were removed. On the opposite side of the head was an increasing swelling of the scalp, which, when opened, showed that the bone was

broken but not perforated by the bullet which had passed through the brain. The bullet had caromed and was found in the brain one and one half inches posterior and below the wound in the skull. The patient had lost a great deal of blood and soon afterwards died.

PULMONARY COMPLICATIONS FOLLOWING ABDOMINAL OPERATIONS

Dr. R P McReynolds said that in looking over a series of 100 celebotimes in order to determine the frequency of postopera tive pulmonary complications he had found two cases of bronchopneumonia one of bronchitis, one of abscess of lungs, and three of pleurisy. The case of bronchits followed an operation for mistaken perforation of a typhoid fever uleer, and may possibly have been due more to the fever than to the operation. It was of short duration, and the patient made an uneventful recovery from the bronchitis the typhoid fever and the operation. The cases of pleurisy have been of the simple plastic variety, and were easily eured by strapping the affected side with adhesive plaster. He gave brief histories of the other cases.

CASE I (Bronchopneumonia following Hysterectomy for Uterine Fibroid)-Operation August 12 1002, ether anæsthesia Mrs P aged thirty five years sought relief from pain and hamor rhage eaused by a small uterine fibroid. He hesitated to do a radical operation upon her because of a tubercular family history and an undoubted latent tubercular focus in her own lungs. An attempt was made to relieve her by dilating and curetting the uterus, but this was a complete failure and one year later he was forced to do a hysterectomy The day following the operation she began to cough and temperature suddenly went up to 1012/xº F, during the next three days there gradually developed a typical bronchopneumonia of left lung Frequent examinations of the sputum failed to demonstrate the presence of tubercular bacilli She made a slow recovery, and left the hospital still suffering from a slight hacking cough Sixteen months after the operation she died from pulmonary tuberculosis There were no abdominal complications throughout The ether and the Trendelenburg position were probably the cause of the pneumonia

CASE II (Bronchopneumonia following Double Salpingo

oöphorectomy for Bilateral Tubo-ovarian Abscess.)—Operation, November 28, 1903; ether anæsthesia. Glass drainage.

The temperature began to go up immediately after the operation, and the following day it was 103° F., and there were present the physical signs of bronchopneumonia of right lung. The coughing caused the through-and-through abdominal stitches to cut out, which retarded her convalescence somewhat. She, however, made a good recovery and is perfectly well to-day. The patient had developed a slight cough (which had been overlooked) the day before the operation. The pneumonia resulted probably from the inspiration of some foreign substance into the lungs at a time when their resisting forces were impaired.

CASE III. (Opening and Draining Abdominal Abscess caused by Perforation of Typhoid Fever Ulcer.)—Operation, March 23, 1902; Chloroform anæsthesia. The convalescence in this case was normal up to the second week, when he developed a slight cough, and a little later there were present physical signs of consolidation of right base. Frequent punctures with aspiration-needle into the pleural cavity and the lung substance itself failed to locate the pus, which finally ruptured into a bronchial tube and was coughed and spit up. He made a tedious but perfect recovery and is strong and well to-day. No abdominal complications throughout, wound granulated and healed normally.

The numerous lymphatics running along the psoas muscle enable the infection to travel upward towards the diaphragm; it is then conveyed to the lungs through the blood current and there forms a foci of infection, around which an abscess gradually develops (metastatic pneumonia).

In these cases were illustrated the most frequent causes of postoperative pneumonia, *i.e.*, the irritating effect of ether itself; the inspiration of foreign substances during etherization; septic emboli.

Other causes are, exposure and wetting during an operation; prolonged use of Trendelenburg position and the forced retention of the intestines upon the diaphragm; intravenous injection of normal salt solution.

To prevent chilling during the operation the electric pad laid over the operating table has been recommended. It is theoretically all right, but practically it is worse than useless, and he mentioned it in order to condemn its use. In prolonged abdominal operations upon patients who are very weak and debilitated, pulmonary complications can to a certain extent be prevented by having the extremities and the chest covered with cotton during the operation

The best way to prevent the patient from becoming wet is to use as little water as possible during the operation

Dr Korte, of Berhn, has a technique which he had copied and found most satisfactory. The hands after being sterilized are wiped dry, and this is repeated after each washing during the operation. The instruments after boiling in soda solution are dried and placed upon a sterile sheet spread over a glass top table. After using an instrument it is taken by a nurse, washed in hot soda solution, dried and placed back upon the table,—another nurse, wearing sterile dry gloves, threads the needles, hands the instruments, etc.

The indiscriminate use of intravenous injection of normal salt solution is capable of producing serious and even fatal cardiac and pulmonary complications. It is a very nice little operation itself and should not be intrusted to one who has not had some surgical experience. One must always bear in mind the possibility of caus ing an embolism from the introduction of air into the veins during the administration of the solution. When the lungs are congested from the irritating effects of the either or from any cause whatee error and the right hear is already embarrassed, the sudden introduction into the circulation of a large quantity of fluid may cause complete cardiac failure, or further embarrass the heart, and so aggravate the existing congestion of the lungs. This is especially apt to occur when the patient is in the Trendelenburg position and the intestines are pished and held up against the diaphragm, thereby preventing the normal downward expansion of the lungs.

A large number of patients requiring abdominal operations have been ill for years, and during this time their bodies hive become more or less worn and emacated. The heart and lungs have adapted themselves to the change and are no longer capable of responding to a sudden call for extra work. If in these cases there is the one indication for intravenous injection of salt solution during an abdominal operation, i.e., loss of blood, it should be given slowly, and the temperature of the solution not allowed to drop from Ito F during the administration

DR JOHN B ROBERTS said that patients get pulmonary complications after operation as a result of oversight in their care. In some instances it is a question of too much ether and too little undershirt. It is the common failing of hospital residents to give too little ether at first, when a great deal is needed, and too much afterwards. When patients are overloaded with ether, particularly if in the Trendelenburg position, it is little wonder that they contract pulmonary congestion, pleurisy, and pneumonia. practice in many hospitals to take off the underclothing of new patients and give them only a night-shirt of thin muslin that is open in the back. The patient is then operated upon, given too much ether during the operation, and afterwards taken to a ward where the beds are placed with the head towards and under the window. Such practice is responsible for some cases of pulmonary complication. Too little thought is given to the care of the patient before and after operation. It is customary to combat these shockproducing agencies by infusing saline solution. The practice of putting salt solution into a vein at the bend of the elbow is becoming entirely too much of a fashion among hospital residents.

Dr. Joseph Spellissy, apropos of the reference of Dr. Mc-Reynolds to the unsatisfactory results from the use of the electric pad during operations, said that one had been used at the University Hospital, in the service of Dr. Willard, during the past five years. The appliance has given a great deal of comfort and is efficient in keeping the patient warm. No burn of a case has occurred, and many patients have undoubtedly been much benefited by its employment.

Dr. Richard H. Harte referred to the scrupulous care exercised by the late Dr. Ashhurst in keeping his patients covered during and after operation as an effective means of preventing complications. Certain surgeons in the West are reported as having ceased to employ ether anæsthesia because of the frequency with which it is followed by pneumonia. That such results can be attributed to ether is not borne out by his own experience, as he does not lose cases from postoperative pneumonia. He is very careful to keep his patients covered, and this unquestionably has its effect in preventing complications. Hospital residents are often careless in such matters, and the routine of admission in many hospitals is to take off the patient's flannels, bathe him, and put on him a thin muslin shirt. This cannot help but cause a tendency to take cold. Patients will not get pneumonia if they are carefully looked after before, during, and after operation. The intravenous

injection of salt solution is a very good thing in many instances, but its use is at times abused

DR JOHN B DEAVER concurred with the statements of Drs Roberts and Harte Regarding the shirts worn by hospital patients, he fought out that question years ago, and now it is a standing rule in the German Hospital that every nationt dons a flannel shirt, and wears it to the operating room if operated upon Dr Deaver has never used the electric mattress, but employs the hot-water bed for all cases of operation upon the upper abdomen, as gall bladder and stomach cases Burns from this appliance will not occur if reasonable care be used In the classes of cases men tioned, the arms, chest, and lower extremities are before operation enveloped in cotton and bandaged With all these precautions, pneumonia may develop Often too much ether is given watches the anæsthetizer. He is often asked how he manages to do this, but it is part of a surgeon's duty. Everybody in the operating room should be watched. Dr. Deaver never allows the use of any anæsthetic but straight other, opposing the use of nitrous oxide, and other combinations, to the extreme There is one trouble with many trained nurses, and that is that they kill people with fresh air, opening windows in the operating or recovery room may easily cause a fatal complication. Saline infusion has its place, but only trained house physicians should be allowed to use it Air will not enter the vein if proper precautions are observed Infusions are seldom called for except in cases of hæmorrhage As to the statement made regarding dry hands and instruments, dry surgery is preferable to wet surgery in every instance Shock comes from prolonged operations It is no wonder that patients die after hysterectomy lasting two hours or longer, when fifteen to thirty minutes should suffice, as a rule The patient is necessarily overetherized in long operations. The hot-water bed is not used to prevent shock but to prevent complications in the thoracic cavity. We hear much about shock from loss of blood, but unnecessary manipulation of the abdominal contents is a more fruitful source. In answer to a question of Dr Taylor as to whether his patients had backache after being on the hotwater bed, and if he attributed this to the heat or to the surface of the bed fitting the inequalities of the patient's body, Dr Deaver said that nearly all his patients complained of backache after abdominal operations, but he had never thought of the bed as being the cause

Dr. James K. Young endorsed what had been said in favor of the electric mattress. No shock has occurred among the children operated upon in the University Hospital since it has been used. Prior to its use, four children were severely shocked, apparently from cold during operations. Recently, while performing a double astragalectomy in another hospital, the lack of the mattress was forgotten for the time, and the patient became severely shocked, although the etherizer reported his condition good after one side had been completed. No burns by the mattress have occurred. Dr. Young believes that some of the burns reported from the use of the mattress are due to the combination of solutions used to wash the patient,—alcohol, green soap, etc. These run under the patient and then on the mattress, and burns result.

Dr. John H. Gibbon, in speaking of the effect of air entering the vein while saline solution is being given, related a personal experience met with at West Chester during the past year. The infusion was being given hurriedly after an operation for a perforated gastric ulcer. The salt solution was allowed to run through the nozzle before it was introduced into the vein, but afterwards, through the glass coupling in the tube, a considerable amount of air was seen to pass into the vein. Some untoward result was at once expected, but no bad effect upon the patient was noticed. Dr. Gibbon has heard of the same thing occurring in the experience of other surgeons, and, while he would not consider it advisable to relax every care to prevent the passage of air into the veins, he thinks the danger of this occurrence may have been exaggerated.

DR. HENRY R. WHARTON said that he formerly used the electric mattress and found it of service in combating shock. One patient afterwards had an immense slough eight inches in diameter over the buttocks, however, and since that time he has been very careful in its employment.

INGUINAL HERNIA OF THE UTERUS.

Dr. John H. Jopson read a paper with this title, for which see page 98.

Dr. John B. Deaver put on record a case of strangulation of the fimbriated extremity of a Fallopian tube of the right side, which was thought to be a femoral hernia.

Dr. John H. Gibbon described briefly a case of left femoral hernia in a woman of seventy years, operated on by him at the

years previous, the later condition being a recurrence. When the sac was opened, it was found to contain the cæcum, with the appendix, the ascending, transverse, and descending colon as far as the sigmoid and the entire omentum. He had previously reported two left careal hermas, this making the third. The patient made a good recovery, and had no return of the hernia when she left the hospital Transposition of the viscera was not present in any of these cases The two reported cases were left inguinal

herniæ DR HENRY R WHARTON mentioned the case of a woman who was thought to have incarcerated omentum in a right in guinal hernia. She was then four or five months pregnant. Operation revealed the contents of the sac to be a pedunculated fibroid

of the uterus This was removed and the patient went to full term DR Jorson said that where a herma of the Fallonian tube was present it was also possible to have hernia of the ovary He had at first but little hope of curing this patient's hernia, but there were

no signs of recurrence several weeks after the operation. There apparently never had been a herma of the bowel. In answer to a question by Dr Ross. Dr Jopson stated that at the time of operation one could not say if the hernia was direct or indirect, but, judging from the history, it was probably congenital and indirect

REVIEWS OF BOOKS.

RÖNTGEN-RAY DIAGNOSIS AND THERAPY. By CARL BECK, M.D. New York and London: D. Appleton & Co., 1904.

The author's aim in preparing this work has been to demonstrate how the Röntgen rays can best be utilized in medical and surgical practice.

The great importance of using a compression diaphragm in the production of good skiagraphs is emphasized. The diaphragm used by Dr. Beck is simple and practical, and by its aid it is possible to bring out structural details on a plate much more clearly than without it.

The author has added much to our knowledge of the usefulness of the rays in the diagnosis of biliary and renal calculi. A careful study of his results demonstrates more clearly than ever the necessity of using the very best coil and tubes if one expects to accomplish anything in this branch of the work. The characteristics of a reliable renal skiagraph, the author states, are that it shows the outlines of the psoas muscle, and the lower ribs, and the structure of the transverse processes. If they show distinctly, a calculus which is not smaller than a pea would necessarily also leave its shadow on the plate.

The chapters on Fractures and the Operative Treatment of Deformed Fracture as indicated by the Röntgen rays are especially valuable.

The illustrations throughout the book are most excellent and are well chosen. The work itself is very practical in that the subject has been treated from a strictly clinical point of view.

PAUL MONROE PILCHER.

PROGRESSIVE MEDICINE Edited by HOBART AMORY HARE, M D
Vol VI, No 1 March 1, 1904 Philadelphia Lea Brothers
& Co

This volume contains chapters on the surgery of the head, neck, and thorax, on infectious diseases, on diseases of children, on laryngology and rhinology, on otology, and an index All of these chapters contain articles on surgical matters

The article on cerebral pressure analyzes the recent experi ences of Kocher, Cushing, and other writers on this subject in the light of the author's own experience. The relation of cerebral pressure to the general systemic blood pressure is receiving the attention which so important a subject merits. Kocher's four stages of intracranial pressure are elearly defined. The idea of bleeding as a therapeutic measure in cases of intracranial hamorrhage with high bounding pulse is purely a symptomatic one, based on the mistaken judgment that the high tension is the cause, when it really is the result of the hæmorrhage Recent studies have shown that the high blood pressure serves the salutary purpose of overcoming the anæmia of the bulbar centres, and preventing death from paralysis of the heart and respiration. Every surgeon should be familiar with these observations upon the effects of traumatism and hæmorrhage of the brain in their relation to blood-Dressure

Some consideration is given to the treatment of trigeminal neuralgia by the injection of osmic acid into the substance of the nerve. There is also an interesting discussion of the most recent contributions on the subject of tumors of the cerebellum.

Some thea of the value of the surgreal treatment of epileps) may be gathered from the results in thirty three cases operated upon and reported by Spratting These cases have been carefully followed and the results tabulated

The subject of malignancy of the lip and tongue is discussed in the light of a large number of contributions which have recently come from English sources One may carry away from this the impression that the best operations are the most simple. The fancy and complicated plastic operations, preferred for cosmetic considerations, divert the operator from the main issue. Cheatle's article, calling attention to the relation between nerve distribution and carcinoma of the face, shows the relation between this disease and the trophic centres. The treatment of chronic facial paralysis by nerve anastomosis is fully discussed. This is one of the most important of the fields of modern surgery, and presents help to a large class of cases.

Tetanus is fully discussed in connection with recent literature. The use of gelatin injections as a cause of the disease and its relation to the blank cartridge are presented. The value of carbolic acid injections is exploited.

This volume is rich in surgical material. From the point of view of authoritativeness, completeness, adaptation to practical needs, good literary style, and availability for reference, the work fills a need and does great credit to all who have had a hand in its making.

JAMES P. WARBASSE.

CORRESPONDENCE.

CERTAIN POINTS IN SUPRAPUBIC PROSTATECTOMY

The paper which was published by me in the January, 1904, number of the Annals of Surgery has received comments in two or three subsequent papers which show that the purpose of the operation there described has not been fully appreciated

Dr Lilienthal, in the May number of the Annals of Sur GERY (p 811), in the course of some very apposite remarks with regard to suprapulse prostatectoms, with which I cordially agree, said "The writer mentioned that in doing the suprapulic opera tion there was a likelihood of tearing out a part of the prostatic urethra" Dr Lilienthal "did not think that accident would occur if the work was not done too hurriedly." The deliberate removal of the prostatic urethra was the main point upon which I desired to lay stress. It is not accidental, but purposeful. I have done many enucleations of portions of the prostate, leaving the urethra intact, but in such cases the results have not been so satisfactory as in the series of cases recorded in my paper. If the urethra be left behind at the time of operation, and a free removal of both lobes of the prostate be accomplished. I am sure that in some cases the urethra subsequently sloughs away and may be recognized after its discharge from the suprapulic wound

Dr J B Murphy, in the Journal of the American Medical Association, May 28, 1904, p 1413 in a very able paper on Prostatectomy, writes, "From a perusal of his article, however, it is clear that his drainage was not satisfactory, as he frequently resorted to irrigations of the bladder with 1 per cent carbolic acid solution." The drainage in all my cases was perfectly satisfactory Suprapubic drainage is certainly more satisfactory than perincal

drainage in cases of enlargement of the prostate. Of this, we have been convinced since McGill's day. The reason for a daily flushing of the bladder is that in all the cases recorded in the paper, cystitis was present, often of a severe type, and the lavage was intended to hasten the return to health of the vesical mucous membrane.

Dr. Murphy further says that suprapubic leakage persisted for about seven weeks on the average. On working out in days the date of healing in this series, I find that in the eleven cases, the closure was complete, in the average, on the thirty-sixth day. In one case, owing to orchitis having occurred, the suprapubic wound did not heal till the ninety-fifth day. In my cases up to date, the average day of closure is the twenty-seventh day.

B. G. A. MOYNIHAN.

LEEDS, ENGLAND.

VALUE OF PEROXIDE OF HYDROGEN.

EDITOR ANNALS OF SURGERY.

I WISH to draw attention to the value of peroxide of hydrogen as a diagnostic help in the recognition of small malignant ulcerations in mucous membranes. I have found it of decided use in the X-ray treatment of rodent ulcers round the eye, when the conjunctiva has become involved. The whitening of the little patches which occurs on the application of the peroxide enabling me to recognize such very early, and preventing me from ceasing treatment too soon, which error I would otherwise have made.

C. M. COOPER, M.B., M.R.C.S.

SAN FRANCISCO, CALIFORNIA.

LISTERINE

SUMMER COMPLAINT

The absolute safety of Listerine, its well defined antiseptic power, and the readiness with which it lends itself to combination with other indicated remedies, are properties which have led many physicians to adopt Listerine as the antiseptic foundation of their prescriptions for Summer Complaint.

A 32-page pamphlet on this subject, containing many valuable suggestions for treatment, may be had upon application. Summer Complaints

Infants and Children

Lambert Pharmacal Co , St. Louis

Colorados

mate

affords every delight to the seeker of health; abundance of sunshine and invigorating dry air; a climate approaching perfection, where the sky is clear and blue, and fog and dampness unknown: where the winters are mild and the summer heat never oppressive.

Its numerous delightful health and pleasure resorts are reached by the elegant trains of

THE COLORADO & SOUTHERN RAILWAY

The following publications sent on receipt of postage:

Picturesque Colorado 3c. Colorado's Climate 2c. Resorts in Platte Canon 2c.

T. E. FISHER,

General Passenger Agent,

Denver, Colo.







HAV EEN

Diluted with four or five times its volume of normal sait solution and aprayed into the mose with a small hand stomizer Solution Adv. nulin Chlorde dries up the accretions, opens the stemosed mostrills releve into the edems and correspondence to the bend, and permitting the

resumption of natural breathing
Two or three applications daily namely afford complete relief
appreciably office class story refer Figure

NOTE.—We also supply Assessed Sycasor (a menical of

NOTE.—We also supply ADBRUGET SURGESTS satisfies containing I time Advent a Citionist' admirable agent to Slay Force for most as it assess Markets or some planetic ported on the ...

EXALIN CHLORICE

11000

A NEW AND IMPROVED PREPARATION OF ERGOT for internal or Hypodermalic Administration

AN ASSISTIC, NON ALCOHOLIC NON IRESTATING
PERMANENT SOLUTION

THE BEST PREPARATION OF ERGOT

EVERY LOT PHYSIOLOGICALLY TESTED

We cornectly urge a trial of Ergone, which many of our med cal friends pronounce the best preparation of Ergot on the market. SUP-LIED IN OFFICE AND ACTICE BOTTLES.

WRITE US FOR LITCHATURE-FREE ON REQUEST.

TOUNCE

ROONE

1 minuter 1 com



KYNKANRYINYMIDOCA

FIFTY-EIGHTH YEAR

Buffalo Medical

Journal

ESTABLISHED 1845 BY AUSTIN FLINT, M.D.

Editor. WILLIAM WARREN POTTER. M.D.

ASSISTANT EDITORS

WILLIAM C. KRAUSS, M.D.

NELSON W. WILSON, M.D.

ASSOCIATE EDITORS

JAMES WRIGHT PUTNAM, M.D. ERNEST WENDE, M.D. JOHN PARMENTER, M.D. HARVEY R. GAYLORD, M.D.

JOHN A. MILLER, Ph.D. MAUD J. FRYE, M.D.

ADVERTISERS

Get the superlative advantage of a Magazine of established reputation, that admits to its columns nothing unethical or of an objectionable nature

RATES ON APPLICATION TO

WILLIAM WARREN POTTER, M.D.

EDITOR AND PUBLISHER

284 FRANKLIN STREET, BUFFALO, N. Y.

Subscription Price, \$2 a Year

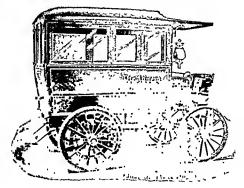
Send for Specimen Number

The cheapest is not always the Best, but the Best is always the cheapest

THE "NEW AGNEW"

Coach=Ambulance

This Sanitarium Vehicle is unexcelled for Convenience, Comfort, and Durability. A Perfect Coach. A Perfect Ambulance.



Contains best of all modern equipments. This is made either as a horse drawn vehicle or an Electric Automobile. . . . Our price is reasonable. Ask for it.

FULTON & WALKER COMPANY,

20th and Filbert Sts., PHILADELPHIA.

We wish to call your attention to our exhibition of ambulances now at St. Louis, located in the Transportation Building
When writter please mention Avenue or Alexander

REDUCED TO THREE DOLLARS A YEAR.

JOURNAL OF THE

Association of Military Surgeons of the United States.

The only Journal devoted to the Military Aspects of Medicine, Surgery and Hygiene in the United States.

Announcement.

Original Articles.

The Journal will, in each number, continue the publication of original papers of the high order which has hitherto characterized the work of the Association. Arrangements have been made for important memoirs relative to the medico-military conduct of campaigns in all lands and by all nations.

Reprints and Translations.

The medico-military literature of other countries will be freely laid under contribution, and all important articles in contemporary literature will be drawn upon.

Medico-Military Index.

All articles in current literature pertaining to military medicine, surgery and hygiene, not republished will be promptly reported.

Editorial Department.

An accomplished corps of collaborators will ecoperate with the editor in presenting timely discussions, reviews, comments, and general information relative to current events of medico-military interest.

Typography and Illustration.

The Journal will continue to be printed in the best style upon heavy supercalendared paper and fine illustrations will continue to be freely employed whenever possible to cluckdate the text by their use.

Subscription, Three Dollars a Year in Advance.

Free to members of the Association of Military Surgeons of the United States

Association of Military Surgeons,

Carlisle, = - = Pennsylvania.

REDUCED TO THREE DOLLARS A YEAR.



NORMAL DIGESTION

A large majority of all patients, in the average practice, suffer from malnutrition, and in all patients the restoration of healthful digestion is the first consideration, the point singled out for immediate attack.

No matter what specific or general medication is administered, something is invariably added for the digestion. If foods are not assimilated, strength slips away, within slips away, and the treatment necessarily fails.

Make it a rule to add

Pabst Extract

to your other medication lt invariably puts life into the patient, something substantial to work on, so that other medicines will give a proper reaction

Only the choicest malt and hops go into Pabst Extract, and the combination is all that science, skill, and liberal expenditure can make it.

It is the best malt extract made-it is perfect.

Pabst Extract Laboratory Milwaukse, Wisconsin

A COSMOPOLITAN MEDICAL JOURNAL

FOUNDED BY JOHN WILLIAM KEATING, M.D., JANUARY, 1879.

The Physician and Surgeon

ANN ARBOR AND DETROIT

EDITED BY

JOHN WILLIAM KEATING, M.D.

WITH THE COLLABORATION OF

REUBEN PETERSON, M.D.

FRANK BANGHART WALKER, M.D.

ALDRED SCOTT WARTHIN, M.D. HENRY O. WALKER, M.D.

CYRENUS GARRITT DARLING, M.D. DAVID INGLIS, M.D.

GEORGE DOCK, M.D.

ARTHUR DAVID HOLMES, M.D.

WILLIAM HORACE MORLEY, M.D. GUY LINCOLN KIEFER, M.D.

CHARLES LANPHIER PATTON, M.D. DELOS LEONARD PARKER, M.D.

ARTHUR PATTERSON REED, M.D. WALTER ROBERT PARKER, M.D.

WILLIAM M. EDWARDS, M.D. WILLIS SIDNEY ANDERSON, M.D.

DAVID MURRAY COWIE, M.D. WILLIAM FLEMING BREAKEY, M.D.

THIS JOURNAL PUBLISHES THE TRANSACTIONS OF THE

CLINICAL SOCIETY OF THE HOSPITAL OF THE UNIVERSITY OF MICHIGAN

A Strictly Ethical Publication

OWNED, EDITED, PUBLISHED, AND CONTROLLED WITHIN THE PROFESSION

Two Dollars a Year

Twenty Cents a Copy

ADDRESS

JOHN WILLIAM KEATING, M.D. ANN ARBOR, MICHIGAN

Diabetes is of Pancreatic Origin

The Rational Treatment is to supply the Ferment whose Absence is the Cause of Diabetes Mellitus or Glycosuria

Tryptogen (Carnrick)

Formula Trypsin Ptyalin Amylopsin combined 5 grs Gold Bromide 1-100 gr, Arsenic Bromide 1-200 gr

is the Most Reasonable Treatment of Diabetes Mellitus and Glycosuria in the Light of Present Knowledge, Tryptogen Meets the Factor in the Problem with its Gold Bromide and Arsenic Bromide.

For Sale by Druggists In Tablet Form Only 100 5 gr Tablets \$1 25 To Physicians \$1 90 Prepared by G W CARNRICK CO 28 Sellivan Street New York

ANTISEPTIC ANESTHETIC ANTIPHLOGISTIC

Unique in its properties and in the extent of its application It is a local anesthetic which saturates and antisepticizes the tissues without injury. It removes pain subdues inflamma tion and absorbs suppuration

PYROLIGNEINE

In surgery it replaces iodoform and bi-chloride affording certain advantages all surgeons will appreciate The clinical reports sent with samples give practical in SAMPLES formation as to the extent of its application Drop us a card NOW for samples and literature

FREE

THE PYROLIGNEINE CO., Winchester, Tenn,

GOOD AND SEASONABLE.

A word about some remedial preparations which the busy practitioner will find always useful, particularly at this season of the year, will no doubt be of interest. we will mention the old time-tried antikannia and salol tablet, so useful during the hot weather, when even the "grown folks" load up their stomachs with the first offerings of the season. Hare says. "Salol renders the intestinal canal antiseptic and is the most valued drug in intestinal affec-The anodyne properties of antitions." kamnia, in connection with salol, render this tablet very useful in dysentery, indigestion, cholera morbus, diarrhœa, colic, and all conditions due to intestinal fermentation. Then the "triple alliance" remedy so well and favorably known by its self-explanatory title, namely, "Laxative Antikamnia and Quinine Tablets." To reduce fever, quiet pain, and at the same time administer a gentle tonic-laxative, is to accomplish a great deal with a single tablet. Among the many diseases and affections which call for such a combination, we might mention coryza, coughs and summer colds, chills and fever, biliousness, dengue and malaria, with their general discomfort and great debility.

We cannot overlook our old friend the Anti-kamnia and Codeine Tablet. The efficacy of this tablet in neuroses of the larynx is well known, but do all of our doctor friends know that it is especially useful in dysmenorrhæa, utero-ovarian pain and pain in general caused by suppressed or irregular menses? This tablet controls the pain of these disorders in the shortest time and by the most natural and economic method. The synergetic action of these drugs is ideal, for not only are their sedative and analgesic properties unsurpassed, but they are followed by no unpleasant after-effects.

PEPTO-MANGAN.

In reply to your favor of the 8th inst., I have the honor to inform you that your Pepto-Mangan (Gude) has been employed with much success, and that it is frequently prescribed here.

B. B. EDLER v. WEHRENALP. Teesdorf, Austria.

IRREGULAR MENSTRUATION AND TREATMENT.

E. C. Willey, M.D., Louisville, Ky. (The Southern Practitioner, July, 1902.)

Practitioners of medicine are consulted by no class of patients who display greater solicitude than those who have amenorrhea.

In the popular mind failure of the menses to appear is supposed to be due either to pregnancy or tuberculosis, and either may cause a degree of anxiety that is truly intense.

A girl 20 years old was sent to me by the matron of a boarding school. She enjoyed good health prior to entering the school, but for the past three months she had not menstruated, and was suffering constantly with vertigo and had attacks of hysteria. I attributed the amenorrhea to change of conditions of life—that of an open life on a farm to that of a shut-in inactive life. Ergoapiol (Smith) was given after each meal for two weeks prior to the day of her usual menstruation. This brought her menses on fully. She has since had no further trouble in this way.

Mrs. A. P. L., aged 35. This lady suffered with frequent attacks of headache, had backaches nearly all the time, and suffered greatly with vertigo. She was the mother of three children, the youngest being six years old. For the past four years she had constantly had scanty menstruation and the blood was very pale. She rarely had the menstrual flow to continue longer than fifteen hours. I was satisfied that the vertigo and all her distress was due to insufficient menstrual flow, and I accordingly put her on Ergoapiol (Smith). She took it through the month, one capsule after each meal; but for a week before the expected period she took two capsules instead of one. She was greatly pleased this time to have a full and free menstruction. Acting on my advice, she took the capsules three times daily for two months, and this acted in a happy manner, and she has now passed an entire year and has not failed to menstruate freely.

My diagnosis was fully confirmed by this woman's health being good in every way since the establishment of menses on a basis of health.

PEPTO-MANGAN.

I have tested Pepto-Mangan (Gudc) with excellent therapeutic results.

DR. CLASS LARSEN.

London, July 7, 1901.

Antiseptic, Anaesthetic, Germicide, Deodorant

Clean, Powerful, Efficient, Perfectly Safe.



RECOMMENDED BY HIGHEST AUTHORITIES

As being inequaled when used for a

POULTICE, COMPRESS, IRRIGATION OR DOUCHE
Leduces Inflammation, Relieves Pain and Itritation Checks Chronic Suppuration

Assists the Address in Eliminating the Possonous Products of Metobolism by Cleansing the Pores of all Sebaceous Matter

It Destroys all Offensive Odors and as Extensively Used in Preparing for Operation SULPHO-NAPTHOL SOAP A Superior Soap for Cutaneous Disorders Sample Sulpho hapthol and Literature sent on application

THE SULPHO-NAPTHOL CO., 46 HAYMARKET SQUARE, - BOSTON, MASS

NATIONAL LINES OF

MEXICO

National Ratiroad Company of Mexico Mexican International Ratiroad Interoceanic Ratiway of Mexico

3300 Miles Under One Management

THREE ROUTES TO MEXICO
Laredo—Eagle Pass—Veracruz

For Time Tables Rates and other information

W F PATON, G R HACKLEY,
Gen l Eastern Agt
11 Broadway 259-235 Quincy Edg
New York, N V Cor Clark and Adams Sis
Chicago III



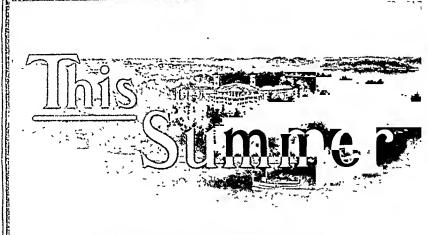
"Colorado Short Line,"

enwood Springs, Colorad Springs, Manitou

Famous Resorts & Rockles.

Elegant Pullman Steeping Cars, Observation Parior Cafe Dining Cars, with Electric Lights and Fans, and Free Reclining Chair Cars

W. E HOYT, G. E. P. Agt , 335 Broadway, NY.



"ROYAL MUSKOKA" HOTEL MUSKOKA LAKES, CANADA

for your vacation

Come to "beautiful Canada"—among the Muskoka Lakes—the loveliest spot you have ever seen.

New scenes, new sports and new associations—a new sense of life in the cool, bracing air.

All the charm of primeval pine forests, rugged rocks and sparkling waters—with the luxury and comfort of the best American hotel.

Muskoka is easy of access from all American points, via Niagara Falls, Detroit and Chicago.

HAY FEVER UNKNOWN

Handsomely illustrated descriptive matter free. Apply to

G. T. BELL, Gen'l Pass'r & Ticket Agt Grand Trunk Railway System, Montreal, Canada.

OR

ALAN F. CAMPBELL, Mgr. "Royal Muskoka" Hotel, Muskoka Navigation Co., Gravenhurst, Ont.

"The land of lakes and islands—the Killarney of America."

NEW BOOKS

Medical Pocket Formulary

By JAMES C. WILSON, M.D., Professor of Practice of Medicine, Jefferson Medical College, Philadelphia Third revised edition, 268 pages 2600 formulæ Handsomeil bound m dark, flexible leather

Practice of Surgery

With Patent Thumb Index, \$2 00 Pocket Size, very thin, \$1 75

Diseases of the Nervous System

By H OPPENHEIN, M.D., Professor of the University of Berlin Author ized translation by E. E. MANER A.M., M.D., Philsburg, Pa. Second American Revised Edition 8vo 900 pages 293 illustrations Cloth, \$5.00; Sheep, \$6.00

Post-Mortem Pathology

A Manual of Post I drawn therefrom the Philadelphia H. Ayer Clinical Labo

Presbyterian Hospi Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania Octavo, 400 pages 163 illustrations Cloth \$3.00

Pediatrics

By Thomas Morgan Rotch, M.D. Professor of Diseases of Children, Harvard University New 4th edition Octavo 1021 pages 62 colored figures, 528 text illustrations, Cloth, \$6.00; Sheep, \$7.00

International Clinics

. . .

avo, 300 pages per volume Cloth, \$2 00 per volume,

Circulary

Write for Free Illustrated Descriptive Booklet of INTERNATIONAL CLINICS

J. B. Lippincott co.

Kindly mail me your II

lustrated Portrait Medical Catalogue and Descriptive

Annale

J. B. LIPPINCOTT COMPANY

Наше

PHILADELPHIA since 1792

Address

LONDON since 1872

When writing, please mention Avvals of Sungery

Marvelous Cures

have been effected by the use of the pure, clear, palatable, cold waters of

Eureka Springs, Arkansas.

Diseases of the stomach, liver, kidneys and nerves; rheumatism; asthma; malaria; yield readily to their use.

Excellent hotels at moderate rates. Delightful mountain scenery. Pine-laden, clear, dry air and plenty of sunshine.

One Night From St. Louis.

Write for "The Summit of the Ozarks."



PERRY GRIFFIN, 111 South 9th St., PHILADELPHIA, PA.

HAL S. RAY, G. E. P. A., 401 Broadway, New York.

THE FOUR-TRACK NEWS

An Illustrated Magazine of Travel and Education

MORE THAN 152 PAGES MONTHLY

Its scope and character are indicated by the following titles of articles that have appeared in recent issues; all profusely illustrated:

issues; all profusel
Among Golden Pagodas
Marblehead.
A Study in Shells
Santo Domingo
Eleven Hours of Afternoon
A Gala Night on the Neckar
Echoes from Sleep; Hollow
Golf in the Rockies
In Barbara Freitchie's Town
Back of the Backwoods
A Feast of Music
Sailors' Snug Harbor
Since Betty Golfs—Poem
Niagara's Histone Environs
In the Old Wood Burner Days
The Land of Liberty and Legends
Nature's Treasure house
Down the Golden Yukon
Corril and Lasso
Little Histones:
An Histones
An Histones
The Treason House
The Treason House

Illustrated:

. Kirk Munroe
M. Inday Taylor
Dr. R. W. Shufeldt
Frederick A. Ober
Cy Warman
Kathleen L. Greig
Munsa Irving
Henry Russell D. ray
Thomas C. Harbaugh
Charles Howard Shun
Jane IV. Guthrie
Sesseth Dean
Fossphine IV-thelm Hard
James O. Whittemore
Guy Morrison Walker
Larl W. Mayo
George Hyde Presson
Munne F. Reynolds
Charlotte Philip

Charlotte Philip Alexander Porter Isabel R. Wallach . William Wait

SINGLE COPIES 5 CENTS, or 50 CENTS A YEAR

Can be had of newsdealers, or by addressing GEORGE H. DANIELS, Publisher Room No. 13, 7 East 42d Street, New York

CHOREA AND ANEMIA.

By ROSHIER W. MILLER. M.D., Ph.G., Barton Heights, Va.

In the etiology of chorea, nothing is noted relative to anemia. It is simply accounted as an accompanying symptom of the condition. Medical literature emphasizes the relation between rheumatism and chorea, with anemia as an important symptom. After observation of several cases, I am strongly of opinion, however, that anemia as a causative factor is worthy of investigation.

Anemia of toxic origin presents pathological conditions which favor the production of chorenic affections. It is true that simple anemia is, as a rule, of secondary origin, and, viewed in this light, it may be argued that if chorea arises, it is the result of the primary and not of the secondary conditions—thus agreeing with the admitted etiology. This argument, however, will not satisfactorily explain those cases of chorea which arise remotely from the primary condition, but recently from the secondary effects.

I submit two cases in which symptoms, treatment, and recovery seem to intimate at least a possible relation between anemia and

Case I.—A female child of eight years gave a history of typhoid fever eight months prior to my visit. According to the mother's statement, the child had made a quick and good recovery, gaining rapidly in weight and exhibiting the energy of her former life. Six months later she became irritable and pale, with pain in her arms and legs, which condition was soon followed by gastric dis-orders and irregular spasms of the muscles of Simple anemia was in evidence the face. from objective and subjective symptoms alone, but was unquestioned in the light of the results obtained from blood examination —the red blood element being present to the extent of barely 3,000,000 red corpuscles per c. m.

This case was treated with two teaspoonfuls of Pepto-Mangan (Gude) and two drops of Fowler's solution, three times a day. After gastric symptoms had abated somewhat, two raw eggs per day were added to the diet. The patient was discharged in five weeks, completely recovered.

Case II.—A temale child of ten years of age; gave history of malaria (a well-defined case of intermittent fever) one year previously. The pallid condition of the child induced the mother to solicit my aid. This case was treated with two teaspoon-

child induced the mother to solicit my aid. Upon examination, I found slight choreaic movements which had escaped the mother's eye, though she did admit that the child "could not sit still very long at a time," and "was constantly working her fingers." The blood examination revealed no plasmodium. The red cells were reduced to 2,800,000 per c. m., with a proportionate decrease of hemoglobin.

Pepto-Mangan (Gude) alone was employed in doses of two drams in a glass of milk three times a day. The blood examination four weeks later showed red cells present to the amount of 3,900,000 per c. m., at which time I dismissed the case completely recovered.

ENTEROCOLITIS AND CHOLERA INFANTUM

Cleane the intestinal tract with calonel and a saline or with castor oil Preseribe a suitable diet, easily digested and non irritating Irrigate the rectum and colon at suitable internals with normal salt solution or some mild antiseptic using for the purpose a soft rubber eatherer or colon tube

Instead of opates which lock up the secretions and thereby favor auto mitovaction, releave the muscular rigidity and the evenuciating pain which is such a drain upon the vital forces by the use of Antiphlogis time is hot as can be borne to the entire abdominal valls and covered with absorbest cotton and a compress. If the pittent is not too far gone, the effect will be astomshing. The little sufferer, who until now has been toesing in agony and restlessness, with drain features, will in most cases quickly become quiet, the drawn look will leave the face and a restful slumber will often supervise and start him upon the road to recovery.

seek. The heat and mosture combined with Antiphlogistine's well known hygroscopic properties directly soothe the inflamed parts, reflexly contracting the visceral blood reseals and relieving their engorgement. The tension of the muscular and nervous systems is further relieved by the action of Antiphlogistine through the solar pleaus thus adding to and emphasizing its local effects upon the inflamed intestines.

The explanation of this, in part, is not far to

OLYCO THYMOLINE

Six Astley Cooper said in beginning a lee true, "Irribation is the foundation of surgical evence." Bilroth a Path, p 54. The plass the infiltration which marks the first -tep in the healing of any wound is necessarily retarded by the application of an anti-epte of an acid or sistingent nature which cognities the plasma of the blood. By their use nature is thwarted in her efforts to repair the damage.

" \nalk\thicesolution (Gi) co-Tby molme),
on the other band, mantanas the fibran in a
soluble form, preparing an easy way for and
to protect the capillaries and other blood
cesels, thereby sustaining and fostering cell
growth resulting in the rapid formation of
healthy graundation"

THE

LENOX HOTEL

IN BUTTALO

High-Grade Modern Construction Fire proof throughout European plan Rates \$150 per day and up ward Room reservations can be telegraphed at our expense

GEORGE BUCHSCHERER Proprietor



SARAH LEIGH HOSPITAL

A new thoroughly up to date private hospital Rooms single or en unite Private Baths Quiet surroundings Salubrious Chinate Especially for Surgical Gynecological and Rest Cure Cases A few Med cal cases taken

Correspondence with physicians invited Address one of the following

DR SOUTHGATE LEIGH, BURGERN IN CHARGE DR STANLET H GRAVES ARROCIATE MESS M A NEWTON SUPER ATTRIBUTE

GLYCOGEN IN THERAPEUTICS.

(New York Medical Journal, April 23, 1904.)

The glycogenic function of the liver has always been more or less a mysterious process. What is definitely known is that glycogen, existing naturally in the liver of all animals, ceases to be secreted whenever the normal conditions of health are impaired. Dr. Jacques de Nittis, of Paris, appears to have been the first to draw attention to the remarkable anti-toxic properties of glycogen. The claims set forth by him were, however, regarded with some skepticism until other investigators, such as de Luschi, Tessier, and de Rorig, gave color to the original investigation and showed further the properties of glycogen in combatting albuminuria and Partaking of the nature of an diabetes. antitoxin, its chief function appears to consist in increasing the phagocytosic properties of the leucocytes whenever the system is called upon to resist microbic invasion. When the system is invaded by disease, the glycogen is either drawn upon so excessively as to deplete the economy, or as a consequence of a specific disease, such as diabetes, the liver ceases, partially or entirely, to sccrete glycogen. The result of this condition is that the body is left defenseless. De Nittis is so sure of his ground on this point, that in a communication to the Biological Society of Paris, March, 1902, he says: "In the struggle against microbic invasion. the resistance is directly proportional to the glycogen of the organism. Without glycogen there can be no phagocytosis." remarkable fact that while the liver secretes comparatively a huge quantity of glycogen during health, small doses of glycogen administered by the mouth, or hypodermically under pathological influences, produce the result set forth by these European investigators, and which appear to be fully confirmed by those who have tested glycogen in this country. De Nittis explains the advantage of glycogen in the treatment of typhoid fever by saying that it stimulates the production of leucocytes, whose phagocytosic activity gradually eliminates the fever germ and indirectly allows a normal heart action by reducing the strain.

Dr. J. W. Maddin, Nashville, Tenn., reports: I have given your Pyroligneine a thorough test, and found it to be all you claim for it, and more.

Dr. Donald McLenna, Tonga, South Sea, reports: I put Pyroligneine to the various tests recommended in your literature and found it excellent in the various conditions you recommend it for. In one severe case at the Tongan Hospital, a giant cell tarcoma, that required repeated operations to keep it down, I found it more efficacious than most of the recommended remedies to reduce the excessive inflammation. We will continue to use Pyroligneine in our practice here at the dispensary and hospital.

GLYCOGEN IN DIABETIC ALBUMINURIA.

(From Monthly Cyclopædia, April, 1904.)

The writer calls attention to the value of glycogen in the treatment of diabetic albuminuria. He recalls the fact that last year he was led to conclude that the hepatic cell. in diabetics seemed to have lost the power of fixing glycogen in its cytoplasm. His researches have since been confirmed by Monier, of Liege. This brings to mind the fact that Frerichs many years ago, having obtained by trocar from a diabetic patient a parcel of hepatic tissue, ascertained microscopically the abscence of glycogen in the hepatic cell. Albuminuria is a grave complication of diabetes and requires active treatment. Unfortunately, this symptom and diabetes are, as it were, antagonistic, the former requiring a milk diet, or at least a diet rich in hydro-carbons; the second, on the contrary, demanding a diet from which are excluded as much as possible starches and sugars. Again, considering the condition of the kidneys in diabetics, certain remedies now used, antipyrin and other toxics, cannot be employed. The writer found that the methodic use of glycogen secmed to avoid this difficulty, and mentions a number of cases with charts to sustain his point. The dose administered began, as a rule, with one gramme (15 grains) in the course of the day. -M. LAUMONIER (Bulletin General de Therapeutique, January 15, 1904).





Virginia Hot Springs

VIRGINIA MOUNTAINS

Where the Early Spring Climpto the Waters, Batha

Hotels and Scenery have no equal la America Rheumatishi gout obesity and nervous troubles

Rheumatism gout obesity and nervous troubles cured New Goll Club Houle with Squash Court Lounging Rooms Café Ping Pong etc Fine Golf Courts Tens a Court Swimming Pool excellent livery and all out-door pastures

The New Momestead

is unquestionably the parts all year round resort hotel in America. Modern in the strictest sense conducted on the broadest times and patronared by the highest class. Brokers office with direct New York were

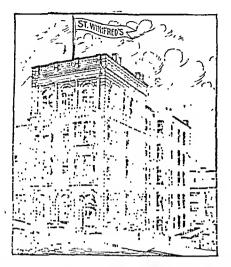
THE CHESAPEALE AND OHIO RAILWAY WORLD'S FAIR SCENIC ROUTE

which operates solid vestibuled electric-lighted dining and observation car trains between New York and Cheenansi with Pallians Sleepers to Louisville St Louis and Chicago allows stop over at Covington Va Dr Hot Springs Compartment car from New York without change

Excurs on tickets and Puliman reservations at C. & O offices 362 and 1854 Broadway, New York and offices Pennsylvania R. R. and connecting lines

and offices Pennsylvanis R R and connecting lines in the Un ted States and Canada Hotel rates bookings and specific information on application to FRED STERRY Manager Hot

Springs Va
For pamphlets and general information as to route
rates and service address H W FULLER, G P A.



St. Winifred's Hospital, 1025 Sutter Street, SAN FRANCISCO, CALIFORNIA.

A New FIRE-PROOF Hospital

with Fifty Sunny Rooms. Centrally located. The most Modern Operating Rooms in the West. A Private Sanatorium for Medical and Surgical Cases. WINSLOW ANDERSON, M.D., M.R.C.P. Lond., etc., Medical Director.

FREE

Catalogue H. THE 20TH GENTURY POLYCLINIC CHAIR

Manufactured by THE PERFECTION CHAIRCO. INDIANAPOLIS, IND.

WALKEASY ARTIFICIAL LEG

Our Art Catalog contains valuable information on Care and Treatment of Stump Preparatory to applying an Art Limb. How Soon to Apply. Art Limbs for Children. Directions for Self-Measurement, etc., etc.

GEORGE R. FULLER Co., ROCHESTER, N.Y. Branches, Chicago. Buffalo, Boston, Philadelphin

OVERHEARD ON THE PIKE.

Mr. Easy-"Why should people visiting The Exposition at night, use more Allen's Foot-Ease than in daytime?"

Miss Foote-"Because under the brilliantr illumination of the grounds, every foot becomes an acre!"

Mr. Easy-" Fair, Only fair! Pray conduct me to the nearest drug store and I promise never to accept a substitute for you or for Allen's Foot-Ease."

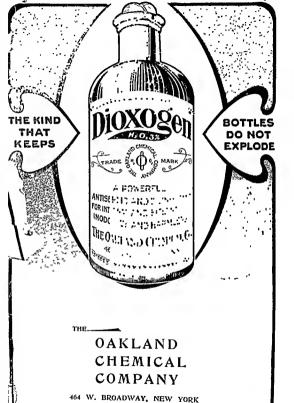
PROTECTION IS WHAT THE DOCTOR WANTS.

The old and reliable Fidelity & Casualty Co., of New York, with Agencies in all Cities, are doing a large business in the way of insuring physicians and surgeons against both trouble and loss from alleged malpractice suits by mischievous adventurers. Physicians who take out a policy with this company are not disappointed with the treatment received, and have the full assurance that they will be protected to the utmost in every particular. This is quite in contrast with the methods of several of the so-called "Defense" Companies, who only agree to defend such litigation, and in the event of damages being obtained, as is too often the case, the confiding physician has to pay the bill himself. It is well for the medical profession to look into these points carefully and see just what kind of a policy and proposition they are paying for.

SOLUTION ADRENALIN CHLORIDE AND ADRENALIN INHALANT.

For years the malady known as hay fever has been the theme of many an able discussion. Its etiology, pathology, prophylaxis, and treatment often have been the subject of study and experiment by physicians, and also by intelligent laymen. The disease has been described as a catarrhal affection of the conjunctivae and the mucous membrane of the respiratory tract, characterized by an annual recurrence at about the same date in a given Another view is that the disease is a case. The only single remedy that neurosis. meets these indications is Adrenalin, as represented in Solution Adrenalin Chloride and Adrenalin Inhalant. By stimulating the vasomotor supply it contracts the arterioles, and thus promptly and efficiently relieves all the annoying symptoms referrable to vas-omotor paralysis. By its powerful astringent action upon the mucous membrane, which it blanches completely in a few moments, it controls symptoms referrable to a catarrhal inflammation of that structure. Indeed, the results that have been accomplished with Adrenalin in this field alone are really remarkable, and of the utmost importance. Parke, Davis & Co., who market Solution Adrenalin Chloride and Adrenalin Inhalant, have prepared a very complete treatise on the topic, which contains more information than is to be found in the average text-book. They will cheerfully mail a copy of the booklet to any physician applying for it.





CATGUT Considerations

NO. 3.

No chain is stronger than its weakest link.

An all-important link in the Surgeon's chain of operative technique is *Catgut*.

To strengthen that link to the utmost, it must be

STERILE,
ABSORBABLE and of
ADEQUATE TENSILE
STRENGTH.

The "VAN HORN" CATGUT can be absolutely depended on to fulfil these requirements.

Samples sent if requested.

VAN HORN & SAWTELL,

307 Madison Avenue,

New York.

555

561

A Monthly Review of Surgical Science and Practice.

Edited by LEWIS STEPHEN PILCHER MD LLD of New York.

WITH THE COLLABORATION OF SIR WILLIAM MACEWEN MD LLD I WILLIAM WHITE PhD MD OP GLASCOW OF PRILADELPHIA

> W WATSON CHEYNE CB FRS OF LONDON

TABLE OF CONTENTS

475

500

510

536

ORIGINAL MEMOIRS

- I Asen c Surg cal lechn que Albet J Ohs r VI D 453 Il Asept c S rgical Techn que By
- George H Wo h WD 464 III Some Studes n Aseps s.
- Charls II rring on M D IV An Adenoma of Sebaceous Glands
- of the Abdom nal Wall Il Il an Conswell Clark W D V Tle Treatment of Hæmatemes s
 - 1, Gastro-Enterostomy I Grego y Co ell 11 D
- VI Postoperat ve Intes nal Obstruc ion By Clarls H Pek MD VII Me os gmo d us and its Rela ons
- to Recurred Vol alus of the Res MD 523
- VIII Meckels Divert culum By Fank E Bunts MD

- IX Contribut on to the Surgery of the Deep Urethra. By G Ir: & Ladsto M D
 - The Un on of Unun ted Fractures of the Neck of the Femur by Open Operation By Leonard
- Freen an MD I The Treatment of Fracture of Pa ella By I Al xander II th
- 10 MD 57 E TRANSACTIONS OF THE NEW YORK SURGICAL SOCIETY
- STATED MEETING May 11 1904 584 TRANSACTIONS OF THE CHICAGO
- SURGICAL SOCIETY STATED MEETING May 2 1904 6at

CORRESPONDENCE

On the Value of Postoperat ve Gastre Lavage

Published Monthly by J B LIPPINCOTT COMPANY Philadelphia Pa,

CHRAT BRITAIN CASSFEL & CO LIMITED AUSTRALASIA CHAS MARKELL & CO. LONDON SYDNEY N S W

Price in United States \$5 00 a Year in Advance Single Number 50 Cents

Pr ce lα Great Brits n and Australasia One Ou nea a Year Ip Advance Sugle Number Two Shillings

THE POST-NAUSEA OF ANESTHESIA

can be fully controlled by using

MGLUVIN

The most dependable remedy for all stomach troubles.

Valuable as an adjunct in Calomel administration.

Highly successful in relieving the Vomiting of Gestation.

WM. R. WARNER & CO.

PHILADELPHIA

NEW YORK

HEALTH TOTAL TOTAL STREET

CHICAGO

NEW ORLEANS

PLEASE REMEMBER

that, in addition to its beneficial action upon the appetite, digestion and assimilation,

GRAV'S Glycerine TONIC comp.

stimulates nutrition, enriches the blood, restores vitality. It is the remedy of choice in debility and malnutrition

THE PURDUE FREDERICK CO.,
298 Broadway, New York

IN THE TREATMENT OF

ANÆMIA, NEURASTHENIA, BRONCHITIS, INFLUENZA, PULMONARY TUBERCU-LOSIS, AND WASTING DISEASES OF CHILDHOOD, AND DURING CONVALESCENCE FROM EXHAUSTING DISEASES,

THE PHYSICIAN OF MANY YEARS' EXPERIENCE

KNOWS THAT, TO OBTAIN IMMEDIATE RESULTS THERE IS NO REMEDY THAT POSSESSES THE POWER TO ALTER DISORDERED FUNCTIONS, LIKE

"Fellows' Syrup of Hypophosphites"

MANY A TEXT-BOOK ON RESPIRATORY DISEASES SPECIFICALLY MENTIONS THIS PREPARATION AS BEING OF STERLING WORTH

TRY IT, AND PROVE THESE FACTS.

NOTICE .- CAUTION.

The success of Follows Syrup of Hypophosphites has tempted certain persons to offer imitations of it for tale. We follows who has examined eamples of several of these imitations finds that no two of them are identical and that all of them differ from the original in composition, in feedom from acid reaction in susceptibility to the effects of oxygen when expected to Wicht or heat in the property of retaining the strychnia is notution and in the medicinal effects.

As these sheep and inefficient substitutes are frequently dispensed instead of the original physicieus are exenctly requested when prescribing the Syrup to write Syr Hypophos. FELLDWS

SPECIAL NOTE —Fellows Syrup to hever sold in bulk but is dispensed to bottles conteining to oz

MEDICAL LETTERS MAY BE ADDRESSED TO

MR. FELLOWS, 26 CHRISTOPHER STREET, NEW YORK.

ANASARCIN

RELIEVES

Valvular Heart Trouble

by reducing number of heart beats, giving the heart rest, increasing the force of the Systole, eausing valves to close more thoroughly, thus preventing regurgitation, relieving the dyspnæa and increasing heart nutrition.

Cirrhosis of the Liver

by equalizing the circulation, dilating the arterioles, thus relieving obstruction in the branches of the hepatic artery and portal radicles, securing better circulation in the liver and more nutrition to the cells and interlobular connective tissue.

Ascites and Anasarca

by causing resorption of the effused scrum into the circulation, whence it is easily climinated with salines.

Exophthalmic Goitre

by its inhibitory power over the eardiac fibres of the pneumogastric, controlling the heart's action indefinitely without detriment, thus preventing enlargement, or restoring to normal if already enlarged, the thyroid arteries and the vessels behind the globes which cause prominence of the cyeballs and enlargement of the thyroid gland, both of which are consecutive to the cardiac disorder.

Bright's Disease

by its power to relieve distal engargements through its wonderful equalizing effect on the circulation, dilating the arterioles and establishing a normal physiological balance between arterial and venous systems.

Sample and Literature to Physicians

Address

THE ANASARCIN CHEMICAL CO.

WINCHESTER, TENN., U. S. A.

Messrs. THOS. CHRISTY & CO., London Agents

Artificial Limbs

WITH RUBBER HANDS AND FEET.

Over fifty years of the most extensive experience with the most satisfactory results of any manufacturer in the world. The Rubber Hand and Foot possess the quality of yielding to every essential angle of the natural, without the use of complicated hinges, joints, and contrivances which annoy and render expensive their daily use.

The accompanying cuts represent a person who lost both legs by a railroad



accident, one above the knee and the other two inches below. He is able to walk half a mile in eight minutes, without a cane or assistance, except his artificial limbs with rubber feet. He can perform a day's work without unusual fatigue; can go up and down stairs—in fact, can do any of the ordinaries of life without exhibiting his loss.

Arms restore appearance and assist greatly in the performance of labor. From our New Illustrated Measuring Sheet, Artificial Limbs can be made and shipped to all parts of the world, without the presence of the patient, with guaranteed success Those who live at a distance and would be inconvenienced by the journey to New York, can supply measurements, and feel the assurance that they will receive our best attention.

Over 28,000 in use. Eminent surgeons commend the Rubber Foot and Hand They are endorsed by the United States and many foreign governments. Received the only

Over 28,000 in use. Eminent surgeons commend the Rubber Foot and Hand They are endorsed by the United States and many foreign governments. Received the only Grand Prize awarded to Artificial Limbs at the Paris Exposition. A treatise, containing 500 pages, with 800 illustrations, sent free, also measurement sheet.



A. A. MARKS, 701 Broadway, New York City

Adrestaut las a Burk Popium alabit Five Grain Antikamnia la ilas

WHICH DO NOT DEPRESS THE HEART
DO NOT PRODUCE HABIT

The Antikampia Chemical Company

ST. LOUIS. MO. U.S.A.



NORTHWEST MEDICINE

An Ethical Monthly Medical Journal owned and controlled by the Medical Profession of the Northwest.

It publishes selected Original articles, Reports of the Local Societies, Editorials, Abstracts and Book Reviews.

Its object is to gather and record the Medical Literature of the Northwest and to promote the welfare of the Medical Profession.

Subscription \$2.50 per annum.

Splendid medium for advertisers. Rates on application. Send for sample copies. Address

NORTHWEST MEDICINE

MARION BUILDING

SEATTLE, WASHINGTON

ORT

THE PROPERTY OF THE PARTY OF TH

Non-toxic and Non-irritating Local Anesthetic, Antiseptic and Styptic. The application of Orthoform to wounds of whatever character relieves pain for hours, frequently days. itching and pain of Pruritis, Eczema, Laryngeal Tuberculosis, Otitis, Conjunctivitis, Used as sprinkling Powder, Insufflation, Emulsion or Ointment. Þø 1 **D**2 D. 75

Literature on application to

VICTOR KOECHIL Q. CO. NEW YORK

P. P. C. S. S. S. L. S. S. Santalan Construe. Games and S. C. S. S. S. S. S. S.

LACE SONET PROPER



Beyond a doubt it insures a freedom from COLDS and bronchial troubles that is remarkable. Physicians admit it. The experience of thousands prove it.

These garments keep the skin dry, vigorous and healthy. is not affected by drafts and sudden temperature changes.

The result—NO MORE COLDS.

All Dr. Deimel Garments bear the Dr. Deimel name. For Sale at Best Dealers Everywhere. For Booklets, Samples and Full Information, address

DEIMEL LINEN-MESH COMPANY THE 491 BROADWAY, NEW YORK

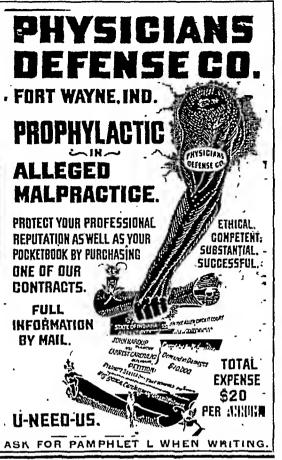
SAN FRANCISCO, 111 Montgomery St. MONTREAL, 2202 St. Catherine St.

WASHINGTON, 1313 F Street, N.W.

BROOKLYN, 510 Fulton St.

BALTIMORE, 110 W. Lexington St. LONDON, 83 Strand (Hotel Cecil).

Dr. Deimel Linen-Mesh Supporters, Suspensories, etc., are made and sold exclusively by J. ELLWOOD LEE CO., Conshohocken, Pa.



dr, broughton's **Sanitarium**

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to

R. BROUGHTON, M.D. ROCKFORD, ILL.

AILK'S WEDICAL TERM TO

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

See that the name R. L. POLK & CO.
IS ON THE ORDER REFORE VOIL

IS ON THE ORDER BEFORE YOU SIGN IT.

POLK'S is the only complete Medical Directory.
POLK'S is the only Medical Directory having an index to all physicians in the United States.

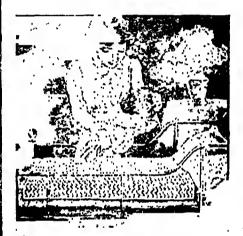
POLK'S has stood the crucial test of time with increasing popularity. It thoroughly covers the field.

L. POLK & CO., Tubilishers

SUBSCRIBE NOW.

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in confort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

SCHERING'S

 $\mathbf{E} \mathbf{x}$ odin.

Tasteless and odorless cathartic, unique in promptness, reliability. pleasantness and harmlessness.

Duotono1 A 100% compound of Lime and Sodium Glycero-phosphates (1:1), convenient for dispensing and administration.

Uro.tropin Effects a urinary antisepsis that was wholly unattainable before its introduction by Prof. Nicolaier.

Formalin Lamp

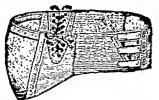
Renders infections shorter and milder, lessens danger of contagion. Invaluable in all zymotic diseases.

Literature on request.

SCHERING & GLATZ, New York.

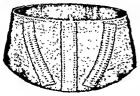
For Every Condition Requiring SUPPORTING BEL Abdominal Support

SPECIAL ELASTIC



e, thread, (net) \$2.06

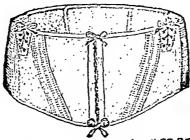
ALL ELASTIC



Made to Order

Quat. "A" Quat. "B"
Price, thread . &6.00 fine slik 7.50 6.00 heavy slik 9.00

SELF ADJUSTING



Pricer

Supporting Belts "Made to Fit"

Pomeroy Company

17 Union Square

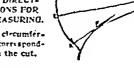
New York

COMFORT



Catalogues on Sunporting Belts, Elestic Stockings, Trusses Orthopedics.

on corresponding lines in the cut.



NET PRICES TO PHYSICIANS ONLY



IT'S SAFE QUALITY

THAT'S WHY

Statement of Ingredients with every bottle; also a Guarantee

SURGEONS AND DENTISTS

in all parts of the world

USE DR. R. B. WAITE'S ANTISEPTIC LOCAL ANAESTHETIC

Sold by prominent dealers everywhere, or prepaid by the manufacturers on receipt of price.

\$1.00 Bottle Free

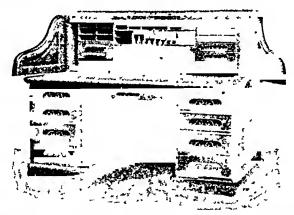
for trial for 25 cents, to pay packing and postage

PRICE

I oz. bottle, \$1.00; 2 oz. bottle, \$2.00; 6 ozs., \$5.00; 12 ozs., \$10.00; 20 ozs., \$15.00

Address Dep't A, THE ANTIDOLAR MANUFACTURING CO. SPRINGVILLE, ERIE COUNTY, N. Y., U. S. A.

HERE'S A RARE CHANCE!



SURPLUS WAREHOUSE STOCK

OFFICE AND LIBRARY FURNITURE

Mostly at wholesale prices, though there are many pieces that

WILL BE SOLD BELOW COST

We'd rather have fewer desks and more money, hence the sacrifice. This offer will hold good for 30 days, providing we then have any of the above stock remaining unsold.

JOSEPH D. SHOEMAKER @ COMPANY

Established nearly a quarter of a century.

926-928 Arch Street, Philadelphia, Pa., U.S.A.

5

When writing, please mention ANNALS OF SURGERY.

Nature's method of providing against the admission of septic matter is by plastic infiltration, then follows an

Effort to wash out the offending matter by an exudation of serum.

To obstruct this wise system by the use of escharotic antiseptics, acts to

Produce conditions which have the effect of delaying

Resolution

H.

G.

 \mathbf{F}



Aids nature in her process of repair, maintaining the fibrin in soluble form, stimulating capillary circulation, fostering and sustaining cell growth, resulting in the rapid formation of healthy granulations. A practical dressing for all wounds, burns,

and ulcerated conditions.

2.00

2.50

\$2.50 9

3.00

4.00 D

SAMPLES AND LITERATURE IF YOU MENTION THIS JOURNAL.

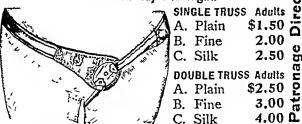
KRESS @ OWEN CO.

210 Fulton Street

New York

Flavell's Elastic Trusses,

·Can be Worn Day and Night.



PNEUMÁTIC PADS. Give circumference of abdomen on line of Rupture. State if for Right or Left.

ELASTIC STOCKINGS.

Give exact Circumference and Length in all cases. NET PRICE TO PHYSICIANS Thread each cach A to E \$2.50 \$2.00 \$1.50 A to G 4.25 3.50 A to I 6.00 C to E E to G 1.50 1.50 A to C Goods sent by Mail upon

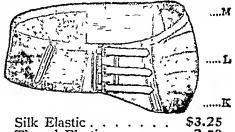
receipt of price. Safe delivery guaranteed.

Send your Orders Direct to

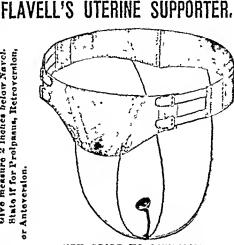
G. W. FLAVELL & BRO.. 1005 Spring Garden St., Philadeiphia, Pa.

ABDOMINAL SUPPORTER.

Give exact circumference of abdomen at K, L,



Thread Elastic



NET PRICE TO PHYSICIANS

\$2.00

When writing, please mention Annals or Surgent.



Blood Food

To feed the body and starve the blood is like pouring water through a sieve. If the blood is thin and weak, the digestive power of the body is weak. Why feed it food that it cannot take care of?

Feed the blood with

Pepto-Mangan ("Gude")

and the whole body is strengthened and reorganized, and the digestive tract will promptly perform its normal function. The already weakened stomach is not compelled to do extra work; Pepto-Mangan ("Gude") is immediately taken up by the blood and does not produce any gastric disturbance.

To assure proper filling
of prescriptions,
order Pepto-Mangan ("Gude")
in original bottles
containing 3 xi.
IT'S NEVER SOLD IN BULK.

PEPTO-MANGAN ("GUDE") is ready for quick absorption and rapid infusion into the circulating fluid and is consequently of marked and certain value in all forms of

> Anæmia, Chlorosis, Bright's Disease, Rachitis, Neurasthenia, etc.

Samples and literature upon application.

M. J. BREITENBACH COMPANY,

LABORATORY, LEIPZIG, GERMANY.

53 Warren Street, NEW YORK.



Kutnow's improved Powder

"The Practitioner," England, says:—

March, 1904

"This preparation possesses a pleasant taste It is a very pleasant form of laxative medicine, acting, if taken in hot water before breakfast, on an empty stomach, in the space of about one hour. Kutnow's Powder will be found most useful by sufferers from hemorrhoids, as it is gentle in its effects, while relieving the loaded portal system by its hydragogue action."

Especially valuable for Surgeons after operations, to overcome the nausea after the anesthesia and

to coax the per-

istaltic action.



Removes Constipation, Indigestion, Biliousness and is most useful in all derangements of the Stomach, Liver, and Kidneys.

LAWSON TAIT

SAMPLES SENT FREE TO PHYSICIANS

APPLICATION FORM

A FREE TRIAL

OF KUTNOW'S POWDER

To any Member of the Medical Profession.

Name____

Address....

Annals of Surgery

Kutnow Bros., Ltd.,

853 Broadway, New York, U. S. A. 41 Farringdon Road, London, Eng.

CHICAGO

ROENTGEN X-RAY

LABORATORY

6000 Skiagraphs taken within past six years

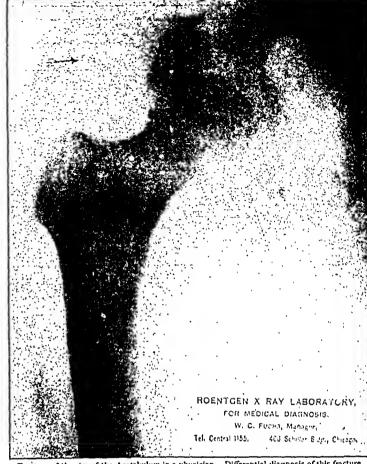
SEND for book containing
Skiagraphs of Tumors, Cysts,
and Blood Clots in the Brain;
Renal, Vesical, and Biliary Calculi; Diseases of Lungs; Cavities, Phthisis, etc.; Diseases of
the Heart, Aneurisms, Pericarditis with effusion; Floating
Kidneys, Tumors, Bone Diseases,
Fractures, Dislocations; also
Deformities of the Hip, Spine,
and other parts of the body.

Established May, 1896 for Medical Diagnosis

W. C. FUCHS

406-407-408 Schiller Bldg. 103-109 Randolph St. CHICAGO

Telephone Central 1155



Fracture of the rim of the Acetabulum in a physician. Differential diagnosis of this fracture from a fracture of the neck of the femur made by the N-Rays.

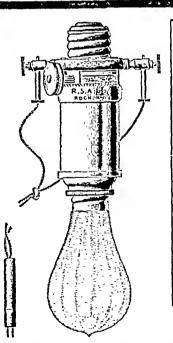
"GEM"

Current Reducerana Controller

FOR Surgical

Lamps

Write Department "J" for New Catalogue, just out.



Cystoscopes
Vrethral Endoscopes
Sigmoidoscopes
Proctoscopes
Batteries
Lamps
Applicators
Sounds
Vaginal Specula
Auriscopes
Tongue Depressors
Etc., Etc.

ASK YOUR DEALER

ROCHESTER SURGICAL APPLIANCE COMPANY, 10 ELM STREET, ROCHESTER, NEW YORK.

ANTIPHLOGISTINE

Has been so long and intelligently known that it is not necessary to discuss in detail its scientific action and therapeutic value.

When considering its usefulness however, we desire to have the physician bear in mind that which he has always been taught—that the essential conditions in all inflammatory processes, whether deep-seated or superficial structures, are practically identical. Then he can appreciate the fact that Antiphlogistine's field is almost limitless. It must ever be borne in mind too, that there is more or less of a retardation of the circulation in the affected part which may reach the point of stasis, in which event the cells starve to death and decompose; in other words the process terminates in suppuration. Antiphlogistine's prime object is to keep the blood circulating in an inflamed part. In pneumonia and other affections involving deep-seated organs Antiphlogistine, by stimulating the cutaneous reflexes, causes a contraction of the deep-seated and simultaneously a dilation of the superficial blood vessels, and this, combined with its hygroscopic properties acting directly, draws the blood to the surface—bleeds but saves the blood.

The potent hygroscopic property of Antiphlogistine, upon which so much depends, should always be carefully preserved by not needlessly exposing it to the moisture of the atmosphere or to water. It should always be heated IN THE CAN, spread upon the skin quickly and covered promptly with a liberal supply of absorbent cotton.

The fact that Antiphlogistine is in the twelfth year of its existence and in daily use throughout the civilized world speaks volumes in its praise. We trust the above may prove interesting to those familiar with Antiphlogistine and may cause some of the tardy ones to investigate the claims in the only satisfactory way—by experimenting and verifying.

SUGGESTIONS:

PNEUMONIA PLEURISY	ADENITIS	SYNOVITIS	FELONS
	ERYSIPELAS	CELLULITIS	SPRAINS
BRONCHITIS	PERIOSTITIS	CONTUSIONS	ULCERS

To insure economy and the best results always order a full package and specify the size required—Small, Medium, Large or Hospital Size.

THE DENVER CHEMICAL MFG. Co. NEW YORK.

Seaboard Air Line Railway

SHORT LINE

To and Through

SHORT TIME

FLORIDA

As well as Via

ATLANTA THE SOUTHWEST

The Land of Manatee

on the West Coast of Florida, offers the best opportunity to the TRUCKER and FRUIT GROWER.

Descriptive pamphlets mailed free

CHAS. B. RYAN, Gen'l Passenger Agt.

Portsmouth, Va.

W. E. CONKLYN, Gen'l Agt. Pass. Dept. Philadelphia, Pa.

Diabetes is of Pancreatic Origin

The Rational Treatment is to supply the Ferment whose Absence is the Cause of Diabetes Mellitus or Glycosuria

Tryptogen (Carnrick)

Formula: Trypsin, Ptyalin, Amylopsin, combined 5 grs. Gold Bromide, 1-100 gr., Arsenic Bromide, 1-200 gr.

Is the Most Reasonable Treatment of Diabetes Mellitus and Glycosuria in the Light of Present Knowledge. Tryptogen Meets the Nervous Factor in the Problem with its Gold Bromide and Arsenic Bromide.

For Sale by Druggists, in Tablet Form Only 100 5-gr. Tablets, \$1.25. To Physicians, \$1.00

Prepared by G. W. CARNRICK CO. 28 Sullivan Street, New York



The Winkley Artificial Limb Co.

LOWELL E. JEPSON, M. S., President. J. H. JEPSON, Secy. and Treas.

JEPSON BROS., (Sole Owners.)

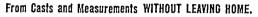
Largest Manufactory of Artificial Legs in the World.



Manufacturers of the Latest Improved Patent Adjustable Double Slip Socket

ARTIFICIAL LEG

With SPONGE RUBBER, Mexican Felt, or English Willow FOOT Warranted Not to Chafe the Stump PERFECT FIT GUARANTEED





For Amputation Six Inches Relow the Knee.

Thousands of our Slip Socket Legs now being worn. U. S. Government Manufacturers. Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN., U.S. A.

WIENSTOWACHS REBEL

against plain cod-liver oil and ordinary emulsions, prescribe Hydroleine. It is agreeable to the weakest stomach no matter how deficient the fat-digesting secretions have become, or how emaciated the patient is. It supplies the lack of pancreatic fluid and bile.

The necessary fat is present in such agreeable form in Hydroleine that patients who are unable to take other preparations of cod-liver oil, find Hydroleine palatable.

Put Hydroleine to the test and observe results.

Literature sent on application. Sold by druggists generally.

THE CHARLES N. CRITTENTON CO.

Sole Agents for the United States,

115-117 FULTON STREET, NEW YORK.

Annals of Surgery

Vol. XL

OCTOBER, 1904

No. 4

ORIGINAL MEMOIRS.

ASEPTIC SURGICAL TECHNIQUE.1

MINIMUM REQUIREMENTS FOR ASEPTIC SURGICAL OPERATING IN A HOSPITAL IN WHICH THE PERSONNEL OF THE OPERATING ROOM IS PERMANENT.

BY ALBERT J. OCHSNER, M.D.,

OF CHICAGO, ILLINOIS.

METHODS can best be tested under the conditions indicated by the subject of this paper because they imply that the responsibility rests upon one person at the head of the surgical work, and that he is permanently supported in his efforts by a staff of assistants who are directly responsible to him, and are consequently bound to apply the principles laid down as valid by their chief.

This makes it possible to develop certain definite methods which are applied constantly by responsible persons in a large series of consecutive cases, and if the methods should not be followed by satisfactory results, it is possible to locate the cause of failure, and to change the methods accordingly until they are satisfactory, and to eliminate such members of the personnel as may be found incompetent to carry out the methods contemplated by the plan.

In order to secure the best possible results, such a system

¹ Read before the American Surgical Association, June 14, 1904.

must be (1) simple and yet comprehensive; (2) it must be uniform, and (3), above all things, it must be reasonable.

Simplicity.—Any system which is complicated is certain to contain elements which will not be fully comprehended by some person who may be necessary to carry out some portion of the plan; and if any one point is omitted in a system, the result of the entire system cannot be satisfactory. Moreover, it is correspondingly more difficult to locate the cause of trouble in any given case.

It is true that many most complicated systems have furnished large series of successful results, but the results have in no way excelled those obtained by vastly simpler methods. Of course, so long as the useless complications in any given system are at the same time harmless, the results will be as satisfactory with as without them.

Uniformity.—One of the most important elements in the development of a satisfactory system lies in the uniformity with which it is practised by the chief. If the chief does not uniformly do the same thing in the same manner under the same conditions, it is impossible for his assistants to thoroughly acquire a system. Of course, it is wise to make changes in order to perfect every system, but this should be done only after careful consideration and not in a haphazard manner. In this manner the youngest assistant without responsibility can acquire the principles involved in the system, and as he continues in his service he will be able to carry out his part without doing mischief, because he has seen each step carried out many times before he is called upon for responsible action in the same direction.

Reasonableness.—Surgery is more and more coming to be a very reasonable, logical profession; and in developing a system of aseptic practice, one can count with much greater certainty upon the probability that every one concerned will carry out the details if he is expected to do things which would appeal to a sensible person, than if he is expected to go through an unreasonable routine performance.

The system must provide for every contingency, and each

element of the system must be carefully studied before it is established. Conditions differ vastly in different institutions, and it is consequently necessary to adjust each individual system so that it provides for all the conditions involved in any given institution.

There must be a definite responsibility which can be established best by having the chief take the blame for all failures. If the system is carefully planned, and the chief is judicious in the selection of his assistants, failures are to be looked for very rarely, and when they do occur, the indication is usually, barring accidents, of course, that there is some element of the system which requires further perfection.

I will briefly outline the system in use at the Augustana Hospital because we have practically all the conditions implied by the title of this paper, and because the system has been developed by constant effort during a period of fifteen years under the same conditions. The methods have been accumulated by visiting many hospitals in this country and abroad, and by weighing the current literature during the entire period since the introduction of antiseptic surgery. The chief effort has been to simplify the methods, at the same time striving to secure the best results.

Disinfection of the Patient.—Unless there is some special reason in the physical condition of the patient, the following steps are taken in his disinfection previous to performing any operation: He receives a full warm soap and water tub-bath on the day before the operation. For the disinfection of his alimentary canal he receives two ounces of castor oil, in the foam of beer, directly before taking his bath, and a large warm water enema on the morning of the operation, except in case of operations upon the rectum. In these cases the enema is given on the evening before the operation.

On the evening before the operation, the skin over the seat of operation is thoroughly scrubbed with green soap and warm water, then shaved, then scrubbed with strong alcohol; then a moist dressing of gauze saturated with a 3 per cent. carbolic acid solution is placed over the field of operation,

over this a large covering of absorbent cotton held in place with a gauze bandage completes the dressing. Just before the operation this dressing is removed and the surface again scrubbed with strong alcohol. For several years we always prepared the skin over the region of the operation immediately before beginning to operate, and found it perfectly satisfactory; but it consumed too much of our time, consequently we now have this done by the surgical nurse on the previous day.

Disinfection of the Operator and Assistants.—The most important precaution taken is to keep the hands out of pus. In dressing suppurating wounds, forceps and rubber gloves are used so as to prevent the hands from touching pus. The operations are performed early in the morning before any one connected with the wounds has made dressings. The fact that it is bad practice to soil one's hands with pus is impressed most forcibly upon every one connected with our work.

Aseptic cases are always operated first, and later those containing pus. In operations upon suppurating cases, rubber gloves are used at the present time; but in former years, by taking the precautions indicated above, practically no infections took place, although no gloves were used.

I operate upon alternate days, so that on the intervening days the same precautions can be taken in dressing the wounds,—no suppurating wounds being dressed until all clean wounds have been finished.

Every evening before retiring, the surgeon and all the assistants scrub their hands with the same care that is employed in disinfection before an operation. The assistant who has charge of the patients who are primarily aseptic has nothing to do with the patients who are not aseptic primarily from the character of their disease and *vice versa*.

The aseptic assistant prepares a table of all the cases which come under his care during this portion of his service. upon which he notes the names of the patients, the age, diagnosis, duration of disease, operation, number and dates of dressings, the result as regards the wound, the date of admis-

sion, and the date of discharge. This record is filled out every evening, and acts as a remarkable stimulant to careful and conscientious work; and the practical results are exceedingly satisfactory.

I speak of these conditions first because they go to form an aseptic conscience in those connected with surgical work, and upon this depends the condition of the wounds rather than upon any special method.

At the present time we wash our hands in an ordinary deep porcelain basinful of warm water, using green soap with a moderately stiff brush; then we carefully cleanse the fingernails with the point of a dull scalpel; then we scrub them once more with a brush, and then with a piece of sterilized gauze in the deep basin, because the gauze seems to rub off all the loose epithelium more perfectly than a brush; then we wash off the soap under the faucet in a stream of warm, boiled water; then we wash in 1-2000 corrosive sublimate solution for a few moments and then with strong commercial alcohol. I have varied this plan from time to time experimentally, and have found that after washing carefully with soap and warm water and cleaning the nails and washing once more thoroughly our wounds remained aseptic. same was true if we supplemented this by washing with a sublimate solution, with or without alcohol, or by washing with the alcohol without the sublimate solution. one point, however, that I insist upon, viz., that every one connected with the operation have a smooth, unbroken skin upon his hands, or wear rubber gloves. Both of the assistants and the surgical nurse wear rubber gloves during all operations, while I wear gloves only in operations in the presence of pus.

We are careful not to breathe or speak into the wound. Every one connected with the operation is constantly on guard to prevent accidental infection of anything which may touch the wound. One nurse alone touches anything coming in contact with the wound, her assistant does anything else that may be necessary.

Disinfection of Instruments.—All instruments, except knives, are boiled for half an hour in a solution of a table-spoonful of baking soda to the quart of water before they are put away after operations, and again before they are used. The knives are washed carefully with water and then rubbed with pads of sterilized cotton, saturated with alcohol, before and after using.

Disinfection of Silk, Silkworm Gut, Horsehair, Drainage Tubes, and Brushes.—This is accomplished by boiling in water for one hour, and preservation in 5 per cent. carbolic acid in water, or in strong commercial alcohol until used.

Catgut is prepared by immersing in sulphuric ether for one month, then for one month in strong commercial alcohol in which one grain of corrosive sublimate to the ounce has been dissolved, the solution being renewed once during this time. It is then preserved indefinitely in a solution of one part of sterilized iodoform, five parts of ether, and fourteen parts strong commercial alcohol. It is never handled by any one except my chief assistant and myself. It is never placed in water. This catgut will last seven to ten days in tissues, according to the size used. It is used for all ligatures both in the peritoneal cavity and elsewhere, and for all buried sutures except in herniæ and in the suturing of bones. For these purposes we employ a chromicized catgut lasting from twenty to thirty days, according to size. This is prepared after the following formula: The catgut is immersed in ether for one month, then in a solution prepared in the following manner: Dissolve one ounce of chromic acid in five ounces of water and add to this one quart of pure glycerin. Immerse the catgut in this solution for seventy-two hours, then wind on wooden boards or ground edged slides, such as are used for mounting specimens for microscopic examination, and place in a solution of one part carbolic acid in five parts of glycerin for two weeks, then preserve indefinitely in the iodoformether-alcohol solution described above. It is important to dissolve the chromic acid in water before adding the glycerin, in order to prevent an explosion. The catgut prepared by these

methods is strong, pliable, slightly antiseptic on account of the iodoform absorbed, and it is invariably sterile. We are careful, above all things connected with the use of catgut, never to draw our stitches too tightly, for fear of causing pressure necrosis.

Disinfection of Dressings.—All dressings are disinfected in a steam sterilizer, two hours being given for steaming and one hour for drying. The same treatment is given to aprons, sheets, and towels.

Disinfection of Everything coming directly in Contact with Wounds.—The basins, instrument pans, jars for dressings, etc., are boiled in soda and water for one hour, then wrapped up in sterilized sheets until used. The tables are scrubbed with soap and water and then with 1–1000 corrosive sublimate in water. They are always covered with a double sterilized sheet when in use. The ordinary pads of cotton and of gauze, sterilized in a steam sterilizer, are used in place of sponges in all operations.

Drainage.—Drainage is always used in very large wounds, such as breast amputations with removal of pectoralis major and minor muscles and axillary glands, also in thigh amputations, usually only for two to four days, never in herniotomies, except for strangulated hernia complicated with gangrene, nor in small clean wounds. The ordinary perforated rubber tube is employed.

It is always used in wounds which are primarily septic. In abdominal surgery we drain acute appendicitis cases if perforation or abscess formation has taken place. We always drain in gall-bladder operations and in suprapubic cystotomy; in pyosalpinx only if there is leakage of pus during the operation. Tubercular joints are tamponed with iodoform gauze. In empyema of the chest we always carry two drains through the cavity, resecting one or more ribs behind and making an opening between the ribs in front.

Whenever there is any doubt as to the aseptic condition of a wound, we drain. We have found the use of an ordinary leather punch very convenient for making the necessary perforations in rubber tubing. In the abdominal cavity we use glass tubes open at the end, having a number of small perforations towards the lower end. A strand of gauze is carried to the bottom of the tube to act as a capillary drain. A piece of iodoform gauze folded about four double is placed over the glass tube, and the latter with this covering carried down to the point to be drained. In operations upon the pelvic organs, it is carried to the bottom of the cul-de-sac of Douglas.

In removing gall-stones from the common duct, a rubber drainage tube is fastened down upon the opening by means of an unchromicized catgut stitch, and a strand of iodoform gauze is sutured down upon the duct, above and below the opening in the same manner. The same method is employed to drain the gall-bladder after removing gall-stones in cases in which the organ is shrunken and cannot be attached to the peritoneum. This method, which was originated by Dr. Mayo, of Rochester, Minnesota, has been employed in many cases, and makes the otherwise serious operation of choledochotomy practically safe. This method is of such extraordinary value that I wish to emphasize it especially.

Irrigation.—We practically never use irrigation during operations, either in the abdominal cavity or elsewhere.

During the early days of my surgical work as an assistant, I observed that wounds in abdominal section healed more smoothly than in any other operations, and the only real difference in the treatment observable was the fact that no irrigation was used in connection with the former wounds, while it was invariably employed in others. I consequently applied the same plan of treatment to all wounds as early as 1889, and I have since constantly operated dry in clean cases, and since a number of years also in cases containing pus. We have treated wounds in circumscribed tubercular lesions by applying strong compound tincture of iodine, and then sponging the area with moist gauze sponges before tamponing with iodoform gauze or before closing with sutures. These wounds have progressed well; but I do not feel convinced that the iodine has been responsible for this fact.

In tuberculosis of the joints we have applied strong carbolic acid to the exposed surfaces of the bones for two minutes, and have then washed these parts thoroughly with strong alcohol until all of the carbolic acid seemed removed.

I am convinced that irrigation is rarely of any real benefit, and that it is frequently harmful in carrying septic material to portions which might have otherwise escaped infection.

In the treatment of wounds which come into the hospital in a septic condition, we sometimes employ constant irrigation with normal salt solution.

My observations have convinced me that it is an exceedingly simple matter to obtain primary union almost invariably if one has a reasonable system, *i.e.*, a system which keeps the attention of operator, assistants, and nurses constantly on guard to prevent accidental contamination.

Whenever some new method is on trial in any hospital or clinic every one is interested, and, consequently, accidental contamination is not likely to occur. It is for this reason that the various new methods are so successful in the hands of their originators.

In having each successive assistant make observations every day throughout his service, we accomplish a very similar condition, because any case of even the slightest infection will be investigated, and all the conditions will be observed which might spoil the young man's comparative record.

Contact Infection.—My observations have convinced me that the only form of infection which must be considered in surgery is contact infection. This is due to the introduction into the wound of septic material from unclean hands, instruments, sponges, or dressings, or from speaking or breathing into the wound.

It is such an easy matter to make instruments, sponges, sutures, and ligatures aseptic that there only remain the hands to account for. These can be made clean without difficulty and kept clean with proper attention, but it is this part of the system which is more frequently lame than any other. Everything that is to come in contact with the wound, the hands

included, is usually clean when the operation is begun, but it is quite another matter to keep these clean throughout the operation, unless every one connected with the operation learns to concentrate his attention upon the work at hand.

In this, again, simplicity is of great importance. The fewer persons who can infect the wound, *i.e.*, the fewer persons who come in contact with anything which in turn comes in contact with the wound, the less are the chances of one of these coming in contact with something which may not be aseptic and then again with the wound.

It is consequently best to have as few assistants directly connected with the operation as possible. In my own work, I alone touch the wound with my hands, and that as little as possible; my first assistant uses hæmostatic forceps and sponges, and the second assistant makes the field of operation as accessible as possible by the careful use of retractors. I handle the instruments myself, and there is but one nurse connected with the operation, and she handles the sponges, drainage tubes, dressings, as well as the sterile sheets, towels, and basins. The same nurse has assisted me in more than 5000 operations, and the same is true of my chief assistant.

Choice of Assistants.—The assistants are graded in the following manner: One chief assistant, three second assistants, and six third assistants.

The third assistants are chosen from the graduating classes of the medical schools and serve for a period of four months. From these the second assistants are chosen. The two from the year's list of eighteen who show the best practical qualifications receive the appointment of second assistants, their service being for a further period of eighteen months. Once in three years, an assistant who has shown during his previous services as second and third assistant that he is especially fitted to become a surgeon is chosen for chief assistant. Each second assistant has two third assistants to aid him in all of his duties. The latter have no responsibilities, however, and never come directly in contact with wounds.

The surgical head nurse is selected for her especial fitness

for the work. She receives a suitable salary and remains in her position permanently. She prepares all the dressings, sutures, and ligature material, sterilizes the instruments, supervises the preparation of the operating-room and the patient on the day previous to the operation. She has three assistants, who are undergraduate nurses, whom she instructs, but who do not come directly in contact with anything which comes into contact with the wound.

ASEPTIC SURGICAL TECHNIQUE,1

WHAT ARE THE MINIMUM REQUIREMENTS FOR ASEPTIC SURGICAL OPERATIONS
IN HOSPITALS WHERE THE SURGEON IS ASSISTED BY A LARGE STAFF OF
INTERNES AND BY NURSES FROM A TRAINING-SCHOOL?

BY GEORGE H. MONKS, M.D.,

OF BOSTON, MASSACHUSETTS,

Lecturer on Surgery at the Harvard Medical School; Assistant Surgeon to the Boston City Hospital.

When we realize to what extent a large general hospital is a sort of dumping-ground, as it were, for all kinds of septic material, and that in many of these institutions there is. every few months, some change in the personnel of assistants or nurses, and especially if the situation is still further complicated by a large staff of surgeons, whose services are interrupted, it must at once be evident, from the point of view of asepsis, under what disadvantages the surgeons of these hospitals do their work. Because of these manifest disadvantages, the task of attempting to simplify the various aseptic processes in use in such hospitals is a delicate one. And yet the number of aseptic precautions has now increased to such a degree as to make it desirable, for the sake of simplicity, and in spite of the good results usually obtained under the old methods, to determine, so far as is possible, which are the really essential parts of the process and which can be done away with. It is obviously impossible, in such a subject as asepsis, to state dogmatically the exact degree to which the various details may be cut down without danger. therefore, content myself with making a few general observations on the subject, endeavoring at the same time to make no positive statements unless I feel that the known facts justify them. In doing this, I shall pass over certain details, as being too trite for discussion, and limit myself principally

¹ Read before the American Surgical Association, June 14, 1904.

to points which to some may appear not so obvious, or about which there may be difference of opinion. Most of the methods here advocated have been put into practice at the Boston City Hospital. It is not claimed that all these methods are better than any others, but simply that they represent one of the ways, consistent with simplicity, in which satisfactory results may be secured.

(A.) PREPARATION FOR AN ASEPTIC OPERATION.

Sterilization of Materials in the Steam Autoclave.—It is found that exposure of materials * in the autoclave to a pressure of fifteen pounds of saturated steam for one halfhour is all that is necessary, provided that the bundles are loosely done up and loosely packed, so that all parts of them are readily accessible to the steam. This is, of course, a great saving in time over former methods, at least, as I have seen them practised. The half-hour should start from the time the air has been completely driven out, and the pressure-gauge registers fifteen pounds. The suggestion for diminishing the amount of time in using the autoclave was made to me by Dr. Charles Harrington, of Boston. That one half-hour is quite sufficient in practice has been proved by the Pathological Department of the Hospital; in fact, bundles containing cultures of the hay bacillus, in its sporing stage, have been found sterile even after fifteen minutes in the autoclave at fifteen pounds' pressure. Salt solution is sterilized in flasks by exposure for one half-hour at ten pounds' pressure.

Preparation of Absorbable Ligatures.—At the Boston City Hospital, at the present time, sterile catgut and kangaroo tendon are furnished to the hospital by reliable dealers. It is thought that, as practically the entire business reputation of such dealers rests upon the sterility of their catgut, it is more likely to be sterile than when prepared in the hospital. Where

^{*}Gauze dressings, sponges, strips, pads, gowns, caps, sheets and towels, silk sutures and ligatures, silkworm gut, silver wire, etc. In case there is not sufficient room in the autoclave for all these materials, the gauze dressings may be equally well sterilized by baking in an oven.

the hospital facilities justify it, however, undoubtedly the best method is to have it prepared in the institution itself, under the eye of the surgeon. This method has, of course, the additional advantage of being by far the most economical.

Operating Room.—Whatever may be the actual danger of air infection, direct or indirect, and pending the results of more definite experiments, the demonstrated existence of pathogenic bacteria in the air of large hospitals * is presumptive evidence of the necessity of some efforts looking towards their exclusion. Because of the general truth that the more dust in the air the more bacteria, our efforts should, naturally, be in the direction of diminishing the amount of dust which is in the room, and of keeping such as remains quiet, thus leaving the air as free from it as possible. Therefore, as belonging to "minimum requirements," it is necessary to mop the floor, wipe the walls, fixtures, and furniture with damp cloths, and to minimize draughts from all sources. It is presumably safer also to filter the air. That the room should be such as to be easily cleaned is self-evident. Chan-

^{*}In order to determine whether the air in the surgical amphitheatre of the Boston City Hospital contained essentially the same number and variety of bacteria found in other hospitals, the Pathological Department, at my request, made exposures of Petri plates for different periods of time during the twenty-four hours. Their conclusions were:

[&]quot;I. That at no time in the twenty-four hours is the air free from organisms.

[&]quot;2. That more bacteria were found after the air had been stirred up, as after the morning cleaning and the class exercises. The smallest number were found between the hours of midnight and 7 A.M.

[&]quot;3. The vast majority of the organisms found were harmless saprophytes, though in some plates of every series staphylococcus albus and aureus were found. The streptococcus was found in two instances only.

[&]quot;4. There was no great difference in the number of colonies obtained at different levels, excepting on those plates laid upon the floor, where the number of colonies was much in excess over the other plates. This was due to the people who passed through the amphitheatre at all hours."

These results are essentially the same as those of other investigators, all of them going to show that while air infection may not seem to be enough of a danger to require more than ordinary precautions, yet the possibility of infection in this way should not be disregarded, especially in a large hospital.

deliers above the operating table, on account of their catching the dust, and because of the difficulty in cleaning them, should be as simple as possible.

It will be extremely interesting to note whether sweeping by the vacuum system, now so extensively used in office buildings, may not be of value in thoroughly removing the dust from operating rooms. By this method the loose dust is sucked up from the different parts of the room, through a nozzle at the end of a hose, and is carried to the basement. I am not aware, however, that as yet the system has been installed in any hospital.

The proper disposal of septic material is essential. The usual method of throwing it into a hopper is probably safe, though a description of the trap-door method, which I understand is now in use in Hamburg, sounds more attractive.

Thorough and systematic fumigation of the operating room with formalin gas is, in my judgment, essential; at least, after all septic cases.

It is possibly safer to have one room for septic cases, and another for clean ones; although it is not at all certain that, with careful cleansing and proper fumigation, one room is not sufficient to meet the "minimum requirements." The advantage of the common practice of allowing the operations on clean cases to precede those on septic ones is so obvious as to hardly need mention.

An operating room, then, which can be easily cleaned, and which is cleaned, where the air is kept comparatively free from dust, where draughts are minimized, and where formalin fumigation is regularly and thoroughly practised, must, for the present at least, be regarded as all that is necessary to meet the "minimum requirements." All elaborate or ornate fittings or furnishings, giving the appearance of cleanliness, are luxuries of questionable value, if indeed they are not positive dangers, as they tend to give a false sense of security.

Preparation of the Patient's Skin.—Experience seems to have demonstrated that in the preparation of the patient's skin no special aseptic precautions are necessary on the day be-

fore operation. The patient should be given a hot bath, and the operating area should be thoroughly cleansed with soap and water and then shaved. That further preparation of the skin is presumably unnecessary is shown by the fact—probably corroborated by the experience of most surgeons—that accident and other emergency cases, on which only a final preparation is made, seem to do just as well, aseptically speaking, as those cases prepared with great pains in the hospital the day before. This suggestion—as to the source of which I am ignorant—has greatly simplified the aseptic process.

Chemical depilatories have been recommended by some as being quite as efficient as the razor for removing hair, and as having also an antiseptic effect of their own. I have had no actual experience with these agents, except to witness their extraordinary action in removing the hair from the arm and leg. Because of the fact that chemical depilatories, even if they should prove to be unirritating to the skin, are unstable compounds and are practically useless if not fresh, their use in general surgery would appear to have no special advantage over the razor.

Though a perfect sterilization of the skin of the patient—and this applies equally to the hands of the operator and his assistants—is probably impossible under any method, the use of 70 per cent. alcohol* has given very satisfactory results

^{*}This was recommended to me by Dr. Harrington, who proved its value by bacteriological experiments. He declared that, while absolute alcohol has no effect whatever on dried bacteria, alcohol of 70 per cent. is a very satisfactory germicide. It is not claimed that this method is better than any other, but only that it yields equally good results, while it is simple, comparatively unirritating to most skins, and, for hospitals at least, inexpensive. The admixtures required by the United States Government do not detract from its efficiency.

Some time ago Dr. Harrington furnished me with a new mixture—
"No. 9," he calls it—which, judging from the bacteriological tests made
at the hospital, is strikingly effective in disinfecting the hands. As yet
I have had no satisfactory opportunity of testing it clinically, but I am
convinced from these experiments that, should it not prove too irritating,
it will be of great value, especially in disinfecting the skin of the patient,
and may displace even alcohol.

as a routine procedure for the last few months at the Boston City Hospital. After a thorough mechanical cleansing of the operating area, the alcohol (70 per cent.) is allowed to drip upon it for two minutes, the part being gently scrubbed at the same time with a sterile wad of gauze in the sterile hands of an assistant.

Disinfection of the Hands.*—The use of 70 per cent. alcohol has been found equally satisfactory for disinfecting the hands; this, of course, after a very thorough mechanical cleansing. The details are as follows:

- I. The hands are very thoroughly washed in hot water, a bristle brush being used. No time is specified for this process, it being required only that the hands should be thoroughly clean in the ordinary sense, and the skin soft. Obviously, such a process should take longer with some hands than with others.†
- 2. The hands are thoroughly dried with an ordinary clean towel. During this process a good deal of softened epidermis may be rubbed off. The nails, being now comparatively soft and pliable, may be trimmed with the scissors; and the closer they are trimmed the better. The spaces beneath the extremities of the nails are cleansed by the nail-cleaner, the projecting flesh at the base of the nails is pushed back, and all hang-nails cut off.
- 3. The hands are washed a second time with soap and hot water.
 - 4. They are washed off with sterile salt solution.
- 5. They are soaked in 70 per cent. alcohol for two minutes. This is the only part of the process where time is specified.

^{*} It is hardly necessary to call attention to the well-known necessity of avoiding contamination of the hands at any time with septic material. Sterile instruments should be used in changing septic dressings, or rubber gloves should be worn.

[†] The suggestion of Freeman, that the hands should be given a chance to perspire by wearing gloves for a long time before sterilization, or by immersing the gloved hands in hot water, seems an excellent one, but it adds very much to the detail of preparation.

6. The hands are dried on a sterile towel, and they are ready for the gloves.

Gloves.*—I am aware that some successful surgeons do not use gloves; nevertheless, I am unable to accept this as evidence of absence of danger from the ungloved hand, for what may not be a danger with one man may be so with another. Rubber gloves should be thoroughly washed after operation, and boiled for six minutes. They should then be inspected for punctures. If it is possible to repair them, they should be mended, and then tested again. They should then be powdered, wrapped in cloths, and sterilized in the autoclave for one half-hour at ten pounds' pressure.† Gloves may also be sterilized by simple boiling.

Instruments.—The customary ten minutes' boiling of instruments has been proved to be sufficient, if properly carried out. One source of infection is the neglect of a precaution, well-recognized, but, to my knowledge, not always carried out. It is absolutely essential that instruments which are difficult to clean, and which remain for a long time in close contact with the tissues in a wound, should be taken apart before sterilizing. Hæmostatic forceps, for instance, with their corrugated jaws, are particularly dangerous if not unlocked before being boiled. Cultures taken from the jaws of forceps which had been soiled with pus, the jaws tightly locked, and the instruments boiled for ten minutes, still yielded positive results. When one considers how hæmostatic forceps crush the tissues, and how long they stay in contact with them, it is difficult to imagine a better method of infection in case the jaws are not sterile. No excuse should justify failure on the part of the assistant to satisfy himself that the forceps have been properly sterilized.

^{*}The only method of procedure, which, if ultimately it prove practicable, is likely to replace the use of gloves, with the attendant danger of infection from puncture, is covering the hands with an impermeable coating.

[†]Wandel and Höhne seem to have succeeded in sterilizing them by mechanical cleansing alone; but I do not know that their methods have been put into general practice by others.

Caps and Masks.—The theoretical danger of infection from the head and mouth of the surgeon justify our insisting upon the wearing of caps and masks at aseptic operations—at least, at major operations—until their necessity is disproved. If caps are not worn, the surgeon's hair often comes in contact with that of his assistant, directly over the wound, and particles of dust, dandruff, and bacteria are likely to descend into it. I have good authority for the statement that saliva contains more bacteria, volume for volume, than sewage.* Minute particles of highly infectious material may be expelled from the mouth, and possibly from the nose, during talking, coughing, or sneezing.

The gauze mufflers which are generally used for masks are most uncomfortable to wear during an operation, and, if the surgeon wears glasses, these are apt to be obscured from time to time by his breath which escapes from the muffler just below them. I have found the Vienna masks, made on a wire frame, much more comfortable than the ordinary mufflers.

Solutions.—The tendency nowadays is to dispense with all solutions during an operation, except warm sterilized salt solution for irrigating and washing. Dipping instruments into corrosive solutions, or rinsing the hands for a few seconds, as we see so frequently done, has no antiseptic effect whatever.

(B.) CONDUCT OF AN ASEPTIC OPERATION.

In the conduct of an aseptic operation, the following are essential on the part of all engaged:

^{*&}quot;In addition to the care of the hands, the surgeon should also have washed his face thoroughly; and if he wears a beard or moustache, special heed must be paid to the cleanliness of these. Very little attention is usually paid to the cleansing of the mouth; yet, when it is remembered that the saliva contains a larger number of micro-organisms than the worst sewage, that streptoeocci and staphylocoeci are amongst the most numerous of these, and that they are proved to pass into the air in loud talking or coughing, it would appear worth the surgeon's while to take into account a eavity which comes so near the operation wound." Lessons in Disinfection and Sterilization. F. W. Andrewes, Leeturer on Pathology, Pathologist and Sanitary Officer to St. Bartholomew's Hospital, London, 1903, p. 123.

- I. Belief in the aseptic idea.
- 2. Fixed habits of asepsis.
- 3. Co-operation, or "aseptic team-work."

Assistants should be taught, what the surgeon already knows, that the fewer the hands entering into an operation, the less the wound is touched with the fingers, the less the talking over it, the shorter the time consumed in operating, the less the ligatures are exposed or handled, just so much less is the danger of infection.

The care of the ligatures, as we all know, is one of the most important details of the operation. Unlike instruments, and, therefore, more dangerous, they are put into the wound to stay there; and if bacteria go with them, such bacteria are not so likely to be removed later, during sponging or irrigating, as those introduced in other ways. It is rather unfortunate that the usual way of putting up catgut is to roll it upon a glass reel, for the temptation to straighten it out in the fingers is almost irresistible; in fact, this, to some extent, is necessary, but the process may easily infect it, especially if it has to pass from hand to hand.

Considering the fact that probably few wounds are absolutely germ-free, and also that latent germs in the tissues may be awakened by injury, assistants should also be taught the importance of injuring tissues as little as possible by manipulation or too much irrigation; of the necessity of removing blood and stopping hæmorrhage; of leaving a dry wound; of uniting the deeper parts of it by buried stitches, enough room being allowed between them for drainage; and of remembering to apply this same rule to skin sutures, special drainage being used for large wounds, particularly where "dead spaces" exist.

In addition to learning the necessary measures to be taken before and after the operation to diminish the chances of auto-intoxication, assistants should also know the importance of strengthening the resisting power of the patient's tissues in every possible way; for the general physical condition of the patient, and possibly the psychical, may often,

so far as asepsis goes, be the determining factors in the case.

All these, and many similar points, should be inherited, as it were, by one assistant from another, and become incorporated into that common knowledge which, especially in a hospital where change is the order of the day, is of more value in keeping up the standard than all else, namely, "hospital tradition."

Many of these precepts the nurses should be equally familiar with, and it belongs to those in charge of the training-school to instruct them in the theory of asepsis; and to the surgeon or his assistants, but especially to the head nurse in charge of the operating floor,—a person who is usually selected for her general efficiency in surgical work,—to see that they are made familiar with the proper practice of it.

SUMMARY OF MINIMUM REQUIREMENTS FOR ASEPTIC WORK, AS GIVEN IN THIS PAPER.

- I. Materials to be sterilized in saturated steam in the autoclave, for one half-hour, under fifteen pounds' pressure; rubber gloves and salt solution under ten pounds' pressure. If there is not sufficient space in the autoclave for the gauze dressings they may be baked.
- 2. In hospitals without proper facilities for sterilization of absorbable ligatures, these to be obtained from reliable dealers whose business reputation is at stake.
- 3. An operating room which can be easily cleaned, and which is cleaned, where the air is kept as free from dust as possible, where draughts are minimized, and where formalin fumigation is thoroughly and systematically practised.
- 4. A hot bath for the patient, and a cleansing and shaving of operating area the night before operation if possible (as an extra precaution). Just before operation, a second cleansing, and sterilization with 70 per cent. alcohol or some equally efficient method.
- 5. Thorough mechanical cleansing of the hands, and sterilization by 70 per cent. alcohol or some method equally efficient.

- 6. Ten minutes' boiling for instruments, special attention being paid to taking apart clamps and hæmostatic forceps, or at least unlocking them.
- 7. Caps, masks, and sterile gloves always to be worn, at least on major cases.
 - 8. Warm sterile salt solution for irrigation and washing.
- 9. Belief in the aseptic idea, fixed aseptic habits, and aseptic co-operation, on the part of all engaged in an operation.
- 10. Instruction of assistants and nurses as above set forth.

SOME STUDIES IN ASEPSIS.1

BY CHARLES HARRINGTON, M.D.,

OF BOSTON, MASSACHUSETTS,

Assistant Professor of Hygiene, Harvard Medical School,

Occasional visits to operating rooms have impressed me with the fact that, to some extent, surgeons are inclined to overestimate the importance of small possible dangers, and to take more or less for granted absolute immunity from some others of greater magnitude. It was the unquestioning faith which some have shown in the instantaneous germicidal power of corrosive sublimate and other chemicals that gave me my first active interest in the general subject of asepsis and infection; and investigation of the actual value of a large number of these substances led me to consider other matters connected with operative work, including the danger of aerial infection, the sterilization of dressings and sponges, and the disinfection of the skin of the field of operation and of the surgeon's hands.

I shall never forget the look of utter consternation on the faces of all concerned when, one day, during an operation for hernia, I placed a sterile Petri dish upon a spot on the instrument table, about eight inches away from anything lying thereon, in the belief that the surgeon, by whose invitation I was to make certain observations, had arranged for the same with his colleagues. One would have supposed that that innocent dish was a seething mass of infection, fully prepared to disseminate the germs of septicæmia in all directions, even as a pinwheel throws its sparks. A hurried consultation was held, while I made my excuses and attempted to explain the absence of real danger. The result was the covering of that

¹ Read before the American Surgical Association at St. Louis, June 14, 1904.

end of the table and the dish with a sterile towel. At this stage of the case, my culpable partner entered and explained matters, whereupon the towel was removed, the culture medium in the dish was exposed, and the operation proceeded. At the close of the operation, the dish was removed and incubated. The result demonstrated that upon each square inch of the dish and, inferentially, of the table and of the instruments thereon, and presumably of the field of operation, no less than 120 organisms, chiefly pus cocci, were deposited from the air in the course of an hour. It is not for me to say how much danger may reside in such a shower of bacteria. Frankly, I do not know, nor does there seem to be any unanimity of opinion on the part of those who have investigated the question of aerial infection; but it seems to me that the subject is not generally considered to be of such importance as the possibility of infection from sweat or from the introduction of an occasional bacterium from the superficial or deeper layers of the skin or from other sources. It has seemed to me that the danger of infection through the escape of droplets of sweat of a carefully prepared hand through an accidental puncture of a rubber glove is accorded undue weight. I have read numerous reports of experiments concerning the infectivity of sweat, and most of them have impressed me as unwarranted in their conclusions, owing to faulty premises and technique. In a recent article on the subject, it is dogmatically asserted, "The purest of sweat is impure; it is never With that statement I take issue. Six different times in my laboratory, sweat has been made to flow from well-cleaned, and so far as is possible, sterilized forearms and hands, encased in sterile glass cylinders heated by appropriate means; and in not a single instance could a bacterial growth be obtained. Moreover, injections thereof in fairly large amounts into animals—subcutaneously, intravenously, and intraperitoneally-were quite devoid of results. That there are bacteria in the various layers of the skin and in the hairfollicles there can be no doubt; but that they exist in the sweat-glands, from which the outflow of secretion would tend

to bar them, is by no means clear. Indeed, I am informed by a number of our leading pathologists that an infection starting in a sweat-gland is exceedingly rare.

Of far greater importance, it seems to me, is the danger of infection through saliva. Repeatedly have I seen surgeons, even in abdominal cases, talking directly into the wound. has been demonstrated by Flügge, of Breslau, and by several others, that in ordinary conversation there is a constant throwing out of minute droplets of saliva, some of which are projected laterally several feet. They are expelled in great numbers in the use of words or syllables beginning with the consonants d, k, p, and t, the formation of which involves the sudden explosive liberation of air held in the mouth under pressure. They may be sent forth as numerously during whispering as with loud speech. Now, the mouth cavity is a singularly unclean place, for the secretions of the mouth are likely to be richer in bacteria than the foulest sewage, and these bacteria are largely staphylococci, diplococci, and streptococci, and are likely to be exceedingly virulent. series of experiments, recently published, the average number of organisms per droplet of saliva as cast out in ordinary speech proved to be no less than 4375. Is not, then, the danger of infection by this means entitled to greater consideration than that more or less imaginary one of infection through sweat?

That the deeper layers of the skin yield bacteria is a well-known fact, but the mere obtaining of positive results from inoculating culture media therewith is no proof of their harmful nature. Indeed, several of the species commonly present are known to be non-pathogenic.

In speaking of these several matters, I have no intention of advocating any lessening of the precautions taken to bring the danger of infecting the wound to a minimum, but I wish to point out the inconsistency of paying so great an amount of attention to the possibility of introducing bacteria, many of them harmless, from one source and another, and neglecting that of the introduction of others, perhaps more dangerous.

that are showered down through the air and projected from the mouth. I have made numerous exposures of Petri dishes to the air of operating rooms, and in every instance the great majority of the colonies produced have been of pyogenic organisms. The numbers deposited have varied widely, the maximum being 131 per square inch per hour.

In his work in the operating room, the surgeon is dependent to a great extent upon the care and thoroughness with which others, whose work he necessarily cannot supervise in every detail, carry out their part. He must assume that the dressings and sponges have been prepared with scrupulous care. He is, in a way, at the mercy of those in subordinate positions, whose carelessness or want of proper instruction may vitiate his best endeavors. To emphasize this point, I will give two illustrations:

The sterilizing plant of a hospital is to me always an attraction, and whenever I visit one I inquire into the methods followed. I was present one day in a room fitted with as perfect a lot of apparatus as one could wish to see. The person in charge had packed one of the autoclaves with dressings, which were wedged in so tightly that one could find hardly a space between them large enough to admit even a finger. On my asking what measure of sterility was expected with such solid packing, I was informed that absolute sterility would be attained in an hour, the steam being under fifteen pounds' pressure. Anybody who has ever studied steam disinfection scientifically is aware of the great necessity of loose arrangement of the objects under treatment, in order that the steam shall have as free access as possible to every part, and that the readiest means of preventing its action is solid packing.

In an autoclave in another institution, I saw a number of sponge-jars with their lids in place. I ventured to open one of them, and found that the cover fitted so tightly that some little force was necessary for its removal. I asked the attendant if the sponges therein contained were to be sterilized by steam or by dry heat, and the answer was "steam;" but it was obvious that the steam could not gain access to the

interior of the jar, from which, moreover, the contained air could not escape. I received permission to test the matter practically. The contents of the jar were replaced by a number of sponges, which I infected with a twenty-four hours' old culture of Staphylococcus pyogenes aureus. The cover was then put on and the whole was subjected to the routine process. Cultures of the sponges were afterwards made in sterile bouilon and incubated for twenty-four hours at 37° C. The results were positive; sterilization had not been effected.

On the other hand, in some hospitals, the sterilization of dressings and sponges is carried to an unnecessary degree of thoroughness, which involves wasting much valuable time. refer to fractional sterilization. Fractional sterilization of such materials as milk and culture media is necessary, on account of the presence of sporing organisms in a fluid rich in nutriment. The ordinary temperatures employed destroy the bacteria, but the spores resist; during the next twentyfour hours these develop into bacteria, which are destroyed by a second heating; and a third treatment insures sterility beyond a doubt. These spores, by the way, are those of certain nonpathogenic organisms; the most resistant pathogenic spores are killed by a few minutes' boiling. But in the case of dressings treated properly with steam under pressure, both the bacteria and the spores present are destroyed with one exposure, for even the very resistant non-pathogenic spores above mentioned cannot resist steam under fifteen pounds' pressure for ten minutes. But supposing they could, what effect would a second treatment on the following day have upon them? None whatever, for in the absence of moisture and nutrient material they could not develop into bacilli, and so long as they remained spores they would, within reasonable limits, retain their resistance. So a second exposure would be as futile as the first, and a third, fourth, and fifth would be equally barren of results.

Carried out with proper precautions as to packing and vacuum formation, sterilization of dressings and sponges requires but one exposure to steam under fifteen pounds' press-

ure for thirty minutes at most. Indeed, I have placed dried cultures of *Staphylococcus aureus* and *Staphylococcus albus* in the pockets and sleeves of two coats rolled loosely together, and have attained sterility in ten minutes with steam under ten pounds' pressure.

The preparation of the hands for surgical work is a subject that has interested me greatly. The potassium permanganate oxalic acid portion of the process has always excited my wonder. Three explanations have been given me of the necessity or advisability of this treatment, namely, 1. That the permanganate destroys bacteria; 2. That it oxidizes the organic matters adherent to the skin; 3. That when one stains the hands in every part with permanganate and then removes the stain with oxalic acid, the hands are clean. As to the assertion that it destroys bacteria: I have experimented with saturated permanganate solution against Staphylococcus aureus and albus, Bacillus coli, and Bacillus pyocyaneus, and have found that ten minutes' exposure is ineffective against all but the last mentioned. These results were obtained not once, but several times. As to the oxidation of organic matter: Potassium permanganate is pre-eminently an oxidizer of organic matter. On dipping the hands into a saturated solution, they are stained a deep brown, owing to the precipitation of a lower oxide, oxygen having been given up to the epidermal scales and other organic matter. This deposit of the lower oxide is soluble in oxalic acid, which thus restores the normal color of the hands. It is assumed that the organic matter (just what harm it will do, unless it is in the form of bacteria, I do not know) is completely oxidized and disposed of. Dip the hands, however, a second time, and see what happens. The same thing. Repeat it. Again it happens, and again, and again. This is due to the fact that, immediately on contact with organic matter, the permanganate is reduced and the hands become, as it were, plated with the precipitated lower oxide, which acts as a bar to further action of the permanganate upon the parts immediately beneath the plating, just as the albuminate of mercury prevents the further

action of corrosive sublimate. A short time ago, I tried the experiment of treating my hands first with permanganate and then with oxalic acid and repeating the process until further treatment failed to give the characteristic brown stain. On the twenty-first trial, the stain was observed to be less intense, and so on to the twenty-fifth, when the experiment was discontinued. From this it would appear that to oxidize all the organic matter possible by this means is an endless task. After twenty-five treatments, I washed my hands with soap and water, and after repeated rinsing in running water, I dipped them again into the permanganate solution. At once the original dark-brown stain appeared as intensely as ever; I was then oxidizing the traces of soap, which, in spite of continued rinsing, adheres tenaciously to the skin, as is proved by the great difficulty one observes in removing, by rinsing, the odor of a scented soap after washing therewith.

As to the statement that a hand once stained and decolorized is necessarily clean, there is but little to say. A dirty hand may be stained and decolorized as well as a clean one, but the dirt remains. Permanganate removes no dirt and destroys only weakly resistant bacteria.

After thorough brushing with hot soapsuds, what agent can be relied upon to kill the bacteria that have not been removed? Not corrosive sublimate 1-1000, if we soak the hands a quarter of an hour; not creolin 1-20, if we soak them much longer; not lysol, nor solveol, nor bacillol, nor sulphonaphtol; not peroxide of hydrogen; not sublamin; not mercuric cyanide; not even formaldeliyde in 5 per cent. solution, even though the skin could stand it. All of these agents and several others I have tested under the most favorable conditions against the common pus organisms and all failed to kill within reasonable periods. Without going unnecessarily into details, I will give my results as briefly as possible. A little more than a year ago. I published the results of a series of experiments which demonstrated, among other things, that corrosive sublimate, 1-1000, requires more than ten minutes' contact to kill Staphylococcus albus, and that weaker solutions (1-5000)

act far more slowly. Recently I tried 1-500, which solution is too strong and irritating for general application, and found that it would kill Staphylococcus aureus in from sixty to ninety seconds and the other pyogenic organisms in from forty to sixty seconds. With 1-100, I found that the aureus was killed after twenty seconds. Now, if 1-100 cannot destroy pus cocci in twenty seconds, and 1-500 can do so only after a minute, and 1-1000 only after ten minutes, what measure of disinfection does the surgeon attain who merely dips his hands into the solutions of corrosive sublimate in common use for only a few seconds and then rinses them off with sterile water or salt solution?

In my tests of the germicidal power of other disinfectant solutions, I employed a number of different species of bacteria; but in the brief report of results now to be made, I will deal only with that pyogenic organism which is the most common and also the most resistant,—Staphylococcus pyogenes aureus.

The following table shows the number of minutes that the organism mentioned remained in contact with the several disinfectants without injury, and also the shortest exposure observed that was sufficient for its destruction. The intervals adopted were as follows: Thirty seconds, 1, 2, 3, 4, 5, 7, 10, 15, 30, 45, and 60 minutes. In only one case was the exposure longer than sixty minutes, and then the agent failed to kill in three hours.

Agent.	Strength.	Failed to Kill. (Minutes.)	Killed. (Minutes.)
Carbolic acid	1-40	3	4
" "	I-20	ĭ	2
Trikresol	1–40	2	3
	1-20	ĭ	2
Lysol	1-40	7	10
***	1-20	2	3
Solveol	1-40	Io	15
	1-20	Io	15
Bacillol	1-40	4	5
_ "	1-20	3	4
Creolin	1-40	10	15
	1-20	Io	15
Sulphonaphtol	1-20	30	45
Hydrogen peroxide Fi	ull strength	4	5

Agent.	Strength.	Failed to Kill. (Minutes.)	Killed. (Minutes.)
Formaldehyde	1 per cent.	60	
	2 per cent.	30	45
	3 per cent.	25	30
* * * * * * *	5 per cent.	15	20
Mercuric cyanide	1-1000	180	
Sublamin	1~1000	10	
Potassium permanganate .	Saturated	Io	15
Potassium permanganate and hydrochloric acid			
(Audrewes)	1 per cent. each	4	5

Here, then, are twenty-two preparations, not one of which acts under two minutes, and most of them only after five.

My next endeavor was to find some preparation that will kill not in minutes, but in seconds. It was obvious that none of the organic compounds mentioned could be depended upon to do this in any strength which it would be practicable to use, and I had, therefore, to turn to the inorganic agents. Of the salts of the metals, corrosive sublimate is beyond question the most powerful, but this cannot be depended upon in its usual solutions, as I have already pointed out; and hence it must be combined with some other agent or agents, if any increase in effectiveness is to be secured. The addition of hydrochloric acid to the extent of 10 per cent. was found to be very effective, but a solution of an irritant like corrosive sublimate with another like hydrochloric acid would obviously be out of the question, on account of its local action; but if this action could be prevented, the combination might be useful. First, I experimented with a mixture which I found would kill Staphylococcus aureus, albus, and citrcus and Bacillus pyocyaneus in less than ten seconds. Then I tried weakening it, first as to one, then as to another ingredient, but always aiming to keep its limit of required time at about ten seconds. ninth combination tried appeared to be as weak with respect to each of the active constituents as could be made, retaining that degree of efficiency—that is, to kill the pyogenic bacteria on silk threads, not in the skin-within ten seconds. I tried it against pus from a carbuncle and against two other specimens of uncertain origin, and at the same time I tried

carbolic acid and trikresol, which had proved to be the quickest in action of the twenty-two solutions above mentioned. Let me say here, that killing bacteria in pus is quite a different thing from killing them on threads and glass beads.

The carbuncle pus was killed by trikresol (1–40) in five and a half minutes and by carbolic acid (1–40) in four; my mixture killed it in less than a minute, though not in thirty seconds. The other specimens of pus were both killed by trikresol and carbolic in two minutes, and by my mixture in less than thirty seconds.

Following are the results of attempts to sterilize the skin. I have repeatedly soaked my hand (without any preliminary scrubbing) for two minutes, and then have had plantings made from material removed from about each nail and from scrapings from the skin of each finger and from the palm. Occasionally, I got a growth; but, as a rule, every tube of bouillon remained clean and sterile. A young man, whose duties included the daily cleaning of cages in the animal room and whose hands were not the subject of much thought or care, soaked his hand (after ordinary washing) on ten different occasions for from two to five minutes; and each time each nail and finger was tested, i.e., ten cultures were made. seven of the experiments there was entire absence of growths; in one, a growth was obtained from one forefinger; in one, from one middle finger; and in one, from one thumb. That is to say, of 100 plantings only three showed growths.

At the Boston City Hospital, Dr. Monks immersed his hands for two minutes without previous scrubbing; the skin of both hands gave negative results, but growths were obtained from the nails of the right hand; the nails of the left hand were sterile. Three of the assistants did the same thing, but after scrubbing, and with these results:

- Dr. H. Left hand sterile; nails gave growth. Right hand sterile; nails sterile.
- Dr. K. Left hand sterile; nails sterile. Right hand sterile; nails sterile.
- Dr. S. Left hand sterile; nails sterile. Right hand sterile; nails sterile.

Examination of the skin of Drs. H. and K. after being engaged in operating showed persistent sterility; but Dr. S.'s left hand yielded a growth. The mixture has been used also in several cases of lacerated wounds.

For my combination, I make no claims whatever, and no assertions that later might have to be recalled. I submit the facts as I have seen them. I do not say that everybody will get the same results that I have seen. To my hands and to those of my assistants, the mixture has caused no irritation beyond the same degree of biting that one notices when in contact with peroxide of hydrogen. Two of the surgical assistants reported slight exfoliation two days after trying it, but nothing more. I recognize that some skins may be more markedly irritated, and that not sufficiently numerous experiments have been made to warrant unqualified recommendation.

The composition of the mixture is as follows:

This mixture, then, contains 60 per cent. absolute alcohol, 6 per cent. commercial (strong) hydrochloric acid, and 1–1250 corrosive sublimate. Now, 60 per cent. alcohol will destroy Staphylococcus aureus in four minutes; 10 per cent. hydrochloric acid is equally effective; and 1–1000 corrosive sublimate will kill it in three minutes. Why a combination containing all three substances, but with lesser proportions of the acid and the salt, is so much quicker in its action than any one of them alone, is an interesting question of physical chemistry.

AN ADENOMA OF SEBACEOUS GLANDS OF THE ABDOMINAL WALL.¹

WITH A REVIEW OF THE LITERATURE OF ADENOMA AND HYPERPLASIA OF THE SEBACEOUS GLANDS.

BY WILLIAM COGSWELL CLARKE, M.D.,

OF NEW YORK.

This tumor is of surgical and pathological interest both from its extreme rarity and from the difficulty of diagnosis. Dr. Emil Bock, in 1880, probably gave the first good description of a real adenoma of sebaceous glands, accompanied by drawings of microscopic sections. Many writers have described hyperplasia of the glands and also primary lesions of the skin where the glands have become secondarily involved, and called them "Adenomata Sebacea." But if one takes into consideration the classification of Unna, which is quoted in the latter part of this article, the difference is manifest.

Present Case.—In July, 1903, a Jewess, eleven years of age, was referred from the Medical to the Surgical Class of the Out-Patient Department of the Roosevelt Hospital, for the removal of a tumor of the abdominal wall.

Past History.—She had always been in good health and had never received an injury of any kind. Menstruation had not commenced, although pubic and axillary hair was fully grown and her breasts were well developed.

Present History.—Three years ago she noticed in the skin a tumor about the size of a pea, situated three centimetres above and five centimetres to the left of the umbilicus. It lay in a line drawn from the nipple downward and slightly inward. Both she and her mother were positive that the growth had not always been present, and also that from the time of its first appearance it had

¹ A study from the Department of Pathology of the College of Physicians and Surgeons (Columbia University), New York.

slowly increased in size, at the same time becoming dark in color. Three months ago it suddenly began to grow more rapidly. There had never been any pain or unpleasant sensation connected with it, and she had not lost flesh or strength.

Physical Examination.—Inspection. The patient was well nourished, apparently in perfect health, large and strong for her years. No growths were seen on any other part of the body. The tumor was oval, smooth, and prominent, about six centimetres by five centimetres in diameter, bulging forward three centimetres. There was some wrinkling of the skin at the angle where it turned to pass over the tumor. On the dome of the growth for an area of three centimetres, the skin was thin, smooth, and dark, on account of the presence of many enlarged blood-vessels.

Palpation.—The tumor was a soft, fluctuating mass apparently made up of two cysts, one considerably larger than the other. It was intimately adherent to the deeper layers of the skin. The superficial layers of the latter were movable over the growth, showing not even the slightest point of attachment. The growth was freely movable on the deeper parts; the abdominal muscles put upon the stretch did not at all limit its mobility.

Operation.—Ether anæsthesia. An elliptical incision surrounding the tumor and exposing its base allowed an easy dissection of the tumor from its bed in the fat of the subcutaneous tissue of the abdominal wall. After its removal, a certain amount of fat and subcutaneous tissue still remained undisturbed, overlying the abdominal muscles. The wound was readily closed by three deep catgut sutures, and by black silk for the skin. The wound healed by primary union and the sutures were removed on the eighth day.

Morphological Examination.—Macroscopic. The material consisted of seven cysts, which composed about four-fifths of the tumor, and the balance was an irregular wedge-shaped mass of firm tissue situated between the two largest cysts. The average size of the cysts was about two centimetres in diameter,—the largest, four centimetres; the smallest, three millimetres. Five of these cysts contained a thin, watery, dark-brown fluid, while the smallest (Plate I, P) was filled with a dark, firm, sebaceous material. The true skin was not attached to the surface of any of the cysts, although the mass was indirectly adherent to the skin because of its situation in the subcutaneous connective tissue.

Microscopic Examination.—Two-fifths of the firm tissue was stroma and the balance epithelial masses and small cysts. The stroma consisted of rather dense connective tissue in bands, whose fibres were arranged in parallel rows. These bands ran between the epithelial alveoli and at times in the alveoli, acting as trabeculæ. In places, the connective-tissue bands, especially some of the connective-tissue trabeculæ found in the alveoli, had undergone hyalin degeneration. Blood-vessels were scanty throughout the stroma. The adventitia of the vessel walls was somewhat thickened. The endothelial cells of the intima were markedly swollen and in places increased in number. Sweat-glands were present, and both the stroma and epithelium were normal in appearance.

Epithelial Cells.—The epithelial cells were arranged in cylinders and oval masses, sections of which in places were much elongated, in others, round or oval (Plates I and II). width of the alveoli on an average ran from 75 to 800 microns, the majority being about 500 microns. The cells in the alveoli were arranged for the most part in a number of small nests, each consisting of from twenty to thirty cells, concentrically placed. Towards the outside of an alveolus the cells were arranged in rows parallel to its boundary. This regular arrangement of cells was especially marked in the outermost row. is worthy of note that in no instance was there an extension of the epithelial cells into the stroma itself, but they were massed together and surrounded by a firm band of connective tissue. The cells themselves were of large size, cuboidal, polyhedral, columnar, or even in places cylindrical in shape. The most regular and symmetrical measured from thirty to thirty-five micromillimetres in diameter. The cell-body stained easily with eosin, taking on a fairly deep color, and appeared faintly granular. The nucleus was large and oval, occupying about one-third of the cell-body. It stained very readily with hæmatoxylin, showing many rather coarse, deeply stained granules. A nucleolus was seen in each nucleus. No mitotic figures were observed in the cells of any of the sections. Spine or so-called "prickle cells" could not be found.

Cell Degeneration.—Scattered here and there, usually towards the centre of the alveoli, or else in the epithelial layers of the cyst walls, were many isolated cells which stained deep purple, both with hæmatoxylin-eosin and picro-acid-fuchsin (Plate III, A).

PLATE I.

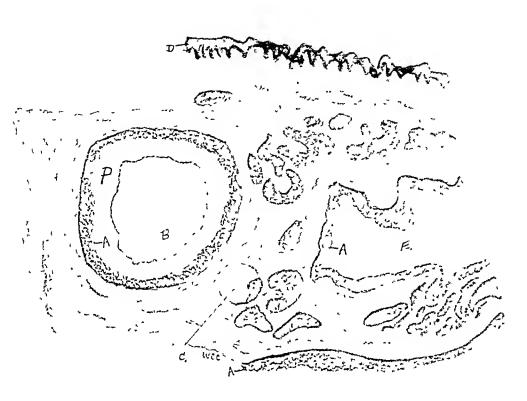


PLATE II.

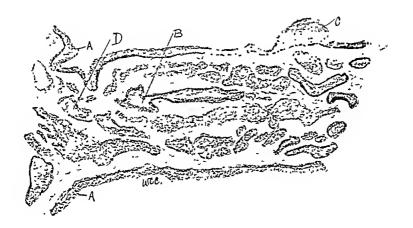


PLATE III.

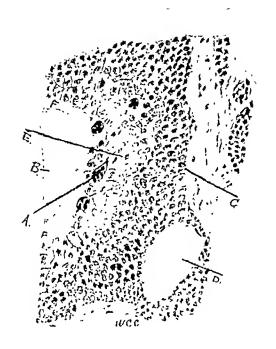


PLATE IV.

C, B

The cell-bodies, staining purple, were often clongated, either homogeneous or vacuolated, with no nuclei showing; apparently nuccus degeneration of the epithelial cells. Besides the above cells, some alveoli contained an area whose cells were large, measuring forty-three micromillimetres in diameter, and vesicular in shape. The cell-body did not stain with either hæmatoxylin-eosin or picro-acid-fuchsin. It was occupied by fine vacuoles, very regular in shape. Occasionally larger vacuoles were seen. The cell-wall was thin, sharply outlined, at times broken down as though the cells had ruptured. This condition was most often observed towards the centre of the alveoli. The nucleus was round and measured eight and six-tenths micromillimetres in diameter. It was situated in some near the centre of the cell, in others near the cell-wall. After staining, the color of the nucleus was a rather faint homogeneous blue, not granular (Plate IV, A).

Cysts-Walls and Contents.-In addition to the seven cysts whose gross appearance has already been described, many others were noted in the microscopic examination, measuring from 160 to 640 microns in diameter. They were for the most part round, at times oval, or very much elongated. The walls of the cysts varied considerably. At times, when the cyst was situated in the centre of an alveolus, the limiting walls were sharp and clean-cut, and the epithelial cells were even and regular in shape, no degenerated or ruptured cells appearing (Plate II, D). Again, especially in the larger cysts, the walls were made up of fifteen to twenty-five layers of epithelial cells, the innermost of them being broken and disintegrated (Plate I and Plate II at A, A, A, A). Here and there appeared the cells mentioned above as undergoing mucous degeneration. Some of the small cysts also had uneven walls, a few of them bounded by the large, clear staining cells undergoing fatty metamorphosis (Plate IV, C), others by jagged walls in which were many cells undergoing mucous degeneration (Plate III, F, F). The contents of some of the smaller cysts, when not dissolved while fixing and hardening the specimen, stained a deep purple color, and invariably there were noted in the walls cells which were undergoing the so-called mucous degeneration (Plate III, B). In other cysts the material stained a deep pink, granular or vacuolated in appearance (Plate I, B). material, especially towards the edge, many cholesterin crystals together with groups of cells and isolated cells resembling those

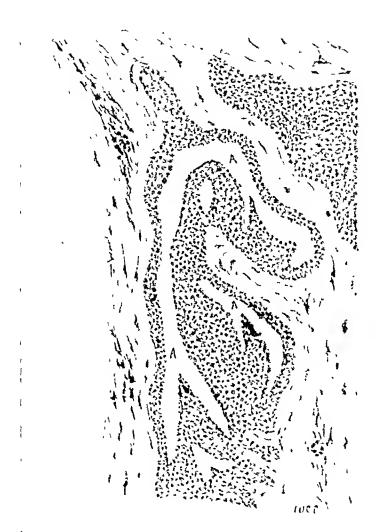
undergoing fatty metamorphosis were noted; also a few nuclei, which stained a pale blue, the cell-body apparently having disintegrated.

In addition to the above cysts, a few openings similar to gland ducts were seen. One opening branched twice, and these branches also divided, resembling a compound tubular gland (Plate V, A). This duct-like arrangement existed in several serial sections, demonstrating that the lumen was of considerable size. The walls, which were sharp and clean-cut in outline, consisted in every case of a number of layers of epithelial cells, not like the ragged walls of the cysts described above.

The Skin covering the Tumor.—The epithelial layers were normal, except that at the summit of the tumor the papillæ of the true skin had all been much shortened and the spaces between the papillæ widened. Between the epithelial layers of the skin and the epithelium of the tumor there was a band of connective tissue, the pars papillaris and pars reticularis of the true skin.

Diagnosis of Present Case.—An epithelial cystic growth of this nature, with cells undergoing fatty changes, could have originated from any one of the following: (A) The glands in the wall of a dermoid cyst; (B) the epithelium of an inclusion cyst; (C) a supernumerary mammary gland; (D) the sweat-glands; or (E) the sebaceous glands of the normal skin.

- (A) The first of the above possibilities is ruled out by the fact that no hair-follicles or other remains of the wall of a dermoid cyst existed, such as stratified squamous epithelium, spine, or prickle cells.
- (B) The presence of compound gland ducts, the absence of stratified epithelium, and the large size of the epithelial cells, discredit the growth as having originated from the wall of an inclusion or epidermoid cyst; also, there are no glands found in the walls of inclusion cysts from which an adenoma might spring.
- (C) The tumor could not have originated from a supernumerary mammary gland, since it did not have any of the characteristics of such a growth.



- (D) The fourth possibility, that the tumor originated from a sweat-gland, can be easily ruled out because in the present tumor the epithelial cell-body did not stain as deeply as sudoriparous cells; and the gland-ducts were compound and thick walled, whereas in tumors growing from sweat-glands the ducts do not usually branch and their walls are lined by only one or two layers of cells. Klauber 1 has recently described sweat-gland adenomata in which there were many small cysts and gland tubules, whose walls consisted of a thin layer of epithelial cells.
- (E) Therefore, having eliminated the four preceding possibilities, the existence of a pathological development of the infundibula of sebaceous glands remains for consideration. In this connection, attention is called to the deep situation of the tumor and its apparent separation from the skin; to the complex alveolar arrangement; to the formation of compound ducts; to the sparseness of ducts in a given section; to the formation of sebaceous material in one of the cysts, probably from cells in the wall, more like cells found in the normal sebaceous glands undergoing fatty metamorphosis; to the absence of laminated material such as is found in cysts formed from cells, which ultimately would have produced pavement or stratified squamous epithelium; and to the large size of the cells in the alveoli similar to sebaceous cells, and not like cells of the epidermis, except the basal cells, which are similar in character and continuous with the germ or basal cells of sebaceous glands.

RÉSUMÉ OF THE LITERATURE OF TRUE ADENOMATA OF SEBACEOUS GLANDS.

Bock,² in 1880, gave an exceedingly good description of the condition. In speaking of adenomata of sebaceous glands, he said the literature was very scanty. He mentioned Schmidt's *Jahrbücher*, in which there is an article by Porta ³ on tumors of sebaceous follicles. The date of this article is 1856; in it there is given a list and the situation of 384 tumors; 238 were cystic, twenty-six of them being sebaceous. No detailed

microscopic description was given. Bock also mentions Förster's "Handbuch der Allgemeine pathologische Anatomie," S. 179, as referring to hypertrophy of sweat and sebaceous glands in contradistinction to that of sebaceous gland tumors. Bock further quotes Rindfleisch, "Lehrbuch der pathologische Geweblehre," S. 288, as describing a case of pure hypertrophy of a sebaceous gland tumor which had a broad base covered by the hairy scalp. The tumor was the size of a pigeon's egg, and its structure resembled that of a mammary gland. Birch Hirschfeld is also mentioned as citing the preceding case, and considers the true hypertrophy of sebaceous glands as probably very rare.

Bock's own specimen was eight centimetres in length, six centimetres in breadth, and three and five-tenths centimetres in height. Cut sections showed many epithelial alveoli separated by connective-tissue bands. The skin was apparently normal, except in places the papillæ were somewhat elongated. The lobules of the tumor had diameters of from one to six millimetres and were either round or elongated. In the gland substance were openings, microscopic in size, some cut squarely across, others obliquely. In places he found the centre of the lobules filled with cells undergoing fatty degeneration, with fat drops and granular masses. Towards the centre of the alveoli the cells were larger, appearing always enidermic in character and dimmed with fat; these changes in the cells were the causes of the construction of fat drops and granular masses in The sweat-glands were normal and regular. drawing showing the general topography of the epithelial alveoli with the central openings and with the normal condition of the skin covering the tumor; also a drawing of one-half of an alveolus, showing the outside cells clear and regular in arrangement, with fat drops increasing in number towards the centre of the alveolus, which is filled with a homogeneous mass.

Eve, in 1881, gave a good description of a partly cystic and partly adenomatous tumor which had become calcified. His plate certainly shows the lobules of an adenoma. The tumor measured one and one-quarter by one-half inches. It was seen to consist of columns, made up of epithelial cells, which presented every variety of size, from minute round masses of cells, one-fortieth of an inch in diameter, to large columns or cylinders one-half to three-quarters of an inch in diameter, having the appearance of alveoli in transverse section. In the sections the alveoli were cut across in various directions and were round or oval; the smaller columns were in places irregular, tortuous, branched, and occasionally uniting. The cells were small, round or oval, closely packed together without intercellular substance. Occupying a position near the centre of many

of the larger columns, and in a few instances of the smaller, unstained granular masses were observed, which were probably the seats of the calcareous matter. This material was found, on further examination, to consist largely of fatty matter containing crystals of cholesterin, and may be regarded as an attempt at the formation of sebum by the gland tissue. Eve thinks it may be regarded as an adenoma associated with the sebaceous glands.

Krauss,⁵ in 1884, in an article concerning giant cells in epithelial growths, mentions an adenoma of sebaceous glands, a tumor, 2.9 centimetres by 2.5 by 1.7 centimetres, on the left arm of a man twenty years of age. This fairly solid tumor was soft and contained a doughy mass in the centre. The skin was quite thin and separate from the growth, a firm connective-tissue capsule enclosing it. The epithelium was arranged in lobules, round or oval in shape, at times tubular. The centres of the lobules and tubules were filled with a firm necrotic mass from degenerating cells. A cut is given showing several alveoli with centres filled with the necrotic masses. He mentions sweat-glands as if they had no connection with the tumor.

Poncet, in 1890, described a case of a man of fifty-three years of age, who, for thirty years or more, had over sixty tumors on his head alone. A cut is given showing a man's head covered with large-sized, closely set tumors; a very prominent one is seen on his forehead. Microscopic examination of one of these tumors by Band showed it to be made up of round lobules separated by connective-tissue bands. The lobules are composed of epithelial cells. The cells have the same characteristics as young sebaceous gland cells. The peripheral cells of the lobules are in regular rows. In the centre of most of the lobules there is an unstained part, light gray or colorless; this part looks like a sebaceous mass. He concludes that it is a tumor made up of epithelial cells similar to sebaceous gland cells.

Jarisch ⁷ gives a few cases of skin tumors, with many good cuts, and also reviews the literature of sebaceous adenoma.

Richard Barlow,⁸ in 1895, reviewed the whole subject thoroughly. He describes a case of multiple tumors of the scalp, of six years' duration, in a person sixty years of age, and calls it a case of adenomata of the sebaceous glands. He speaks of the definition of adenoma, and quotes Förster, Cohnheim, Ziegler, and others. He also speaks of the different types of lesions of these glands. In conclusion, he says an adenoma may occur in sebaceous glands, may become calcified, and also may become cancerous. He gives several plates of adenoma of sebaceous glands of the scalp.

Curtis and Lambret,9 in 1900, review the subject up to

date, and describe a large tumor of eight years' growth, which clinically was thought to be malignant; histologically it was thought to be a simple adenoma of the sebaceous glands and similar to Bock's, Monti's, and others.

Borst ¹⁰ in his book on tumors shows a picture of a sebaceous adenoma which was made up of lobules of epithelial cells separated by bands of connective tissue. The lobules are very irregular in shape, their centres occupied by masses of sebaceous material. He says that a pure adenoma of sebaceous glands, either a solitary, nodular, fleshy, or sometimes ulcerated, encapsulated tumor, may exist, which is made up of epithelial lobules, the centres of which are filled with fatty masses. The connective tissue and vessel walls may undergo hyaline degeneration; also, in an adenoma the peripheral germ cell layers, which shut in or enclose the epithelial cells of the follicle, spread out, while the old central layers of cells are mostly overwhelmed by fat infiltration, and, in consequence, they are not of a typical form, so that the enclosed fat mass in the centre grows from the rupture of these cell-bodies.

Krompecher,¹¹ in 1903, mentions the relation that may exist between the basal cells of hair-follicles, or of sweat or sebaceous glands, and flat-celled cancers, also the similarity of structure of sebaceous glands to breast glands; and gives a diagram of different types of sebaceous gland hypertrophy, showing how different types of tumors may develop from the different epithelial layers of the skin.

Levings,¹² in 1903, speaks of adenomata of sebaceous and sudoriparous glands. "These growths are of rare occurrence. When taking origin from the sebaceous glands they are closely adherent to the skin, are round or slightly lobulated, elastic, and reasonably hard growths. They are made up of an aggregation of alveoli, and are to be differentiated from the ordinary wen and from the tumors which are entirely subcutaneous. In size they are usually small, often not exceeding that of a hickorynut, but in exceptional cases they have become quite large."

Ribbert ¹⁸ mentions adenoma of the sebaceous glands and speaks of Barlow's article.

Unna's ¹⁴ Review of the Relation of Adenoma and Hyperplasia of the Sebaceous Glands.—Under hypertrophy of the sebaceous glands, Unna says that simple hypertrophy of the sebaceous glands appears partly as an accompaniment of other processes, partly as an independent tumor. The independent tumors are rare; much more frequent is the more or less diffuse hypertrophy of the glands, which chiefly accompanies the chronic forms and results of seborrhæic catarrh, especially of the nose and the middle of the forehead.

Adenoma of sebaceous glands, Unna calls "Steatadenoma." "The definition of adenoma can certainly not be applied, where the sebaceous gland epithelium produces solid bodies, which grow into solid epithelial masses or epithelial cords; we have, then, some form of acanthoma proceeding from the sebaceous gland. The participation of the sebaceous gland in an epithelial growth, proceeding from the follicle or the surface epithelium, is a very frequent occurrence accompanying the most varied inflammatory and hypertrophic conditions." "It thus appears as if we must abandon the definition of steatadenoma in the strict sense of the word, since the benignant tumors of the sebaceous glands are either hypertrophies or acanthomata of the sebaceous glands. But there might also be tumors occupying a median position between the condition just mentioned, in that, for example, solid bodies first come from the sebaceous epithelium, which, after they have developed in a tumor-like fashion, again recall their point of origin by fatty degeneration of their cells. Then we would have a growth in a new direction agreeing with the definition of an adenoma, if we retain it, and at the same time the proof that the cells of the growth had not lost their character as sebaceous cells during growth. If no such tumors were to be found, then it would be better to abandon altogether the term 'adenoma of the sebaceous glands;' but there is the case recorded by Bock which agrees with the following strict definition of steatadenoma, benign tumor-like growths of irregular formation proceeding from the epithelium of the sebaceous glands, in whose outgrowths fatty but no colloid metamorphosis takes place." Unna quotes from Bock, and says, "The development of the glandular lobules took place from below upward. Bock founded the diagnosis steatadenoma on the triple recognition, first, of the normal behavior of the sweat-glands; second, of the absence of cancerous processes, and, third, of the presence of acini, which in their development, evolution, fatty degeneration, and calcification corresponded with sebaceous glands." In conclusion, he says that one must admit that this origin would have been still clearer, if, at the more recent parts of the growth, a true formation of sebaceous glands had been recognized, with a reticular spongy character of the cell protoplasm, as in the fatty changes in true sebaceous cells.

RÉSUMÉ OF THE LITERATURE OF HYPERPLASIA OF SE-BACEOUS GLANDS, EITHER ALONE OR SECONDARY TO HYPERTROPHY OF THE SKIN.

Pringle,¹⁵ in 1890, reported a case of many small, indolent, firm, whitish, solid papules or little tumors of the face embedded in the skin, the largest the size of a small pea and near the nasolabial fold. When pricked with a pin, white sebaceous matter could be expressed. The superficial layers of epithelium along the whole section were rather thin; the rete showed excessive and irregular involution, dipping deeply into the subjacent derma. The chief pathological changes were found in the corium; its upper papillary layer was enormously hypertrophied, but it was in the deeper layers that the essential lesions lay. They consisted of an enormous increase in number and complexity of the sebaceous glands. The gland epithelium was everywhere well formed, the acini at no spot exhibiting retrogressive changes. A good microphotograph was given; also a chrome lithograph of a girl's face studded around the nose and on the cheeks below the eyes with small flat tumors. He cites Balzer's ¹⁶ cases, and agrees with him in using the term "adenomata."

Caspary,¹⁷ who followed Pringle in 1891 with a very similar case, described a girl's face covered with small nodules. He showed a good lithograph and microscopic sections of the conditions. He gave Pringle's as the sixth and his as the seventh case on record.

Pollitzer, 18 in 1893, described and gave a clear photograph of a group of thirty small adenomata, as he calls them, on the forehead of a man twenty-five years of age, in whom the condition had lasted six years. Each nodule was as large as a medium-sized barley-corn. Two were cystic and sebaceous matter could be expressed from almost all. The microscopic examination of excised specimens showed that almost the entire specimen was made up of sebacous gland tissue, which had preserved the lobulated

arrangement of the normal gland. The resemblance in both the appearance of the cells and their arrangement to normal sebaceous glands was so close that he suspected it to be hypertrophy of the gland. Actual measurement of the individual gland cell showed no increase in size beyond the normal, and there were far more than the normal number of lobules. The condition, then, could only be called adenoma. He gives a cut, and says, "Two club-shaped processes of epithelium may be seen shooting out from the side of the root-sheath of a hair, exactly like the buds from which the glands are formed in the embryo. Near the end of one of them a small island of epithelial cells appears as if cut off from the growing shoot. Such an isolated group of cells would, as they underwent their physiological fatty degeneration, necessarily give rise to a sebaceous cyst. Sweat-glands appear normal and far below the tumor." He said there were scarcely twenty cases of this rare disease observed. and this was the first and only one in America. He mentioned Crocker's. Jameson's, and Caspary's cases.

Unna says that if any one attempted to apply the term adenoma to peculiar forms of simple sebaceous hypertrophy in such cases as those of Pringle and Caspary, it would be impossible to draw the line, and we should have to call every enlargement of the sebaceous glands adenoma.

Pezzoli,¹⁹ in 1900, described a very similar condition, and mentioned that Balzer and Ménétrier were the first to describe it in 1885. He gave a case of a great number of very small discrete tumors on the face of a young girl, showing a picture of the same, also a cut of a microscopic section.

Walther Pick,²⁰ in 1901, described with great care and detail a diffuse mass of small cystic skin tumors on the face of a man suffering from acne rosacea. The cysts were filled with a homogeneous material, and some of the cells were degenerating; also, some of the cell-bodies were much swollen, and at times fine protoplasmic scaffolding was seen which is found in normal sebaceous gland cells. The nature of the degeneration he attempted to prove by orcein stain and orange tannin. In normal sebaceous gland ducts, the dye stained the material a light yellow, and the cyst contents the same color. He also gave several very good lithographs of a diffuse hypertrophy or adenomatous condition of the sebaceous gland and hypertrophy of the skin, with no real tumor formation.

SHMMARY

It is seen from a consideration of the cases cited by Bock and others, that, although denied by some observers, true adenomata of the sebaceous glands, without associated lesions of the skin, do exist, and that these adenomata undergo fatty metamorphosis with a formation of cysts. Tumors of this sort are rare, large ones especially so. On the other hand, adenoma, or an hyperplastic condition of the gland, secondary to or together with hypertrophy of the skin, is not so uncommon.

True adenomata of the sebaceous glands may become calcified or carcinomatous. The stroma of the tumor may undergo hyaline degeneration. Giant cells may occur in them.

The epithelial cells may undergo mucous degeneration and form cysts similar to those derived from the cell undergoing fat metamorphosis.

It has been shown that the tumor which is the subject of this paper is neither a dermoid cyst nor a simple inclusion cyst, nor is it derived from a supernumerary mammary gland, or the sweat-glands. It would therefore appear that the growth is a true adenoma starting from the infundibula of the sebaceous glands and retaining the type of the secreting portion. It thus has all the characteristics of a steatadenoma or adenoma of the sebaceous glands; namely, the presence of acini, which in their development, evolution, fatty metamorphosis, and calcification correspond to sebaceous glands.

I am indebted to Professor T. M. Prudden, Dr. John H. Larkin, and Dr. Charles Norris for many suggestions in connection with this article.

BIBLIOGRAPHY.

¹ Klauber. Beiträge zur klinischen Chirurgie, Band xli, S. 311.

² Bock. Virchow's Arch., Band 1xxxi, S. 503.

^{*} Porta. Schmidt's Jährbuch, Band xcvi, S. 127.

⁴ Eve. Transactions of the Pathological Society, London, Vol. xxxiii, p. 335.

Krauss. Virch. Arch., Band xcv, S. 249.

Poncet. Revue de Chirurgie, 1890, p. 244.

- ⁷ Jarisch. Arch. f. Dermat. u. Syph., Band xxviii, S. 163.
- ⁸ Barlow. Deut. Arch. f. klin. Med., Band lv, 61.
- ° Curtis and Lambret. Revue de Chirurgie, Vol. xxii, p. 147.
- ¹⁰ Borst. Geschwulstlehre, Band ii, S. 577.
- ¹¹ Krompecher. Der Bazalzellenkrebs.
- ¹² Levings. The Ætiology, Pathology, Diagnosis, and Treatment of Tumors, p. 405.
- ¹⁸ Ribbert. Geschwulstlehre, S. 384.
- ¹⁴ Unna. The Histopathology of the Diseases of the Skin, p. 814.
- 15 Pringle. British Journal of Dermatology, 1890, Vol. ii, p. 1.
- ¹⁶ Balzer et Ménétrier. Arch. de Physiologie, 1885, p. 564.
- ¹⁷ Caspary. Arch. f. Derm. u. Syph., Band xxiii, S. 371.
- ¹⁸ Pollitzer. Journal of Cutaneous and Genito-urinary Diseases, 1893, Vol. ii, p. 475.
- 19 Pezzoli. Arch. f. Derm. u. Syph., Band liv, S. 193.
- 20 Pick. Arch, f. Derm. u. Syph., Band Iviii.

THE TREATMENT OF HÆMATEMESIS BY GASTRO-ENTEROSTOMY.1

WITH REPORT OF CASE.

BY F. GREGORY CONNELL, M.D.,

OF SALIDA, COLORADO,

Attending Surgeon, Denver and Rio Grande Railroad Hospital; Consulting Surgeon to St. Vincent's Hospital, Leadville.

In cases of hæmatemesis, two lines of operative treatment are available,—the direct and the indirect. The direct includes the theoretically ideal methods, and others less ideal, but still acting primarily upon the source of the hæmorrhage. The indirect methods are those operative procedures that exert a healing or hæmostatic influence, in some manner not involving the ulcer itself.

These two methods may be classified as follows:

Excision of ulcer.

A. Direct.

2. Partial gastrectomy or pylorectomy.
3. Ligation of the principal artery.
4. Cauterization or curettage of ulcer.
5. Ligation of mucous membrane.
6. Ligation of all coats.

B. Indirect.

1. Gastro-enterostomy.
2. Pyloroplasty.
3. Gastrotomy.

In considering Class A as a whole, it will be found that there are many reasons why these methods are impracticable, and many times cannot be carried out.

These objectionable points are such as the difficulty of locating the ulcer; the source of a hæmorrhage sufficient to cause death may easily escape detection. The fact that in 20 per cent. of the cases the lesion is multiple, the presence of

¹ Read before the Western Surgical and Gynæcological Association, December, 1903.

firm and vascular adhesions, sometimes to adjacent and important organs, such as the pancreas; likewise the indistinct limitations of the pathological tissues. All of which have tended towards making impracticable the direct methods of attack of the bleeding point.

As to the choice of these methods, it would seem to lie between ligature of all coats, as recommended by Andrews, and partial gastrectomy or excision of the ulcer, if the last two are practicable.

The high mortality rate of some and the impracticability or the unreliability of the others of the direct methods have been the cause of a general turning to the indirect methods, especially to that apparently all-healing operation, gastro-enterostomy.

The exact manner in which a gastro-enterostomy usually causes a healing of the ulcer is a question more or less debatable. But the explanation usually accepted is, in effect, as follows: The anastomotic opening allows of a comparatively perfect drainage; the stomach is rapidly emptied, is therefore given rest and quiet; the hyperchlorhydria is diminished, and, as the opening is at the most dependent portion of the stomach, and to the left of the ulcer-bearing area, the ulcer is not irritated by prolonged contact with the stomach contents.

It has also been claimed that the admittance of the small amount of bile and pancreatic juice that find their way into the stomach exert a beneficial influence upon the ulcer.

In certain cases, where the gastro-intestinal opening becomes closed because of the improved and more patent condition of the pylorus, the symptoms of gastric ulcer, and even hæmorrhage, have been known to return. As to whether this is due to the formation of new ulcers, or to a revival of the old, it cannot be definitely stated.

As to the stopping of gastric hæmorrhage, by the performance of a gastro-enterostomy, such substantial reasons as those stated above for the healing of the ulcer cannot be presented.

The chief reason for expecting hæmorrhage to cease after the operation will be on account of the rest given to the stomach by the new opening, so, to a large extent, doing away with peristalsis, and at the same time allowing the organ to contract; and also the lack of irritation of the bleeding point by the stomach contents.

These conditions, and others, do, without doubt, favor the stopping of hæmorrhage and the formation of a clot.

But that there are cases in which these measures are not sufficient to arrrest the hæmorrhage, cannot be doubted. And it would certainly seem unreasonable to expect such roundabout and indirect measures to stop a profuse hæmorrhage in instances where a large artery has been opened laterally, as in the case reported with this contribution to the subject.

And even in cases where the bleeding was found to be due to a parenchymatous oozing, the operation has been known to fail to arrest the hæmorrhage. It would seem that, as a method of stopping hæmorrhage from a large artery, it cannot be relied upon. And that in cases in which the bleeding comes from the smaller capillaries, it is practically, but not always, sufficient.

The amount of the hæmatemesis will be found to be no criterion as to the size of the bleeding vessel; in cases that have rapidly terminated fatally, the bleeding point has been so small as to escape detection at autopsy, even in the hands of the most expert.

On the other hand, cases in which the bleeding vessel has been found to be of such caliber as the splenic artery, life has persisted for weeks, after the beginning of the hæmorrhage. Therefore, as we are not able to determine, with any reasonable degree of accuracy, as to the nature of the source of the hæmorrhage, it would seem that a gastro-enterostomy was indicated *only* after a thorough search for the bleeding point.

The exact status of gastro-enterostomy as a hæmostatic measure in gastric hæmorrhage is not definite, as may be very forcibly brought out by the following quotations from Moynihan and from Robson:

Moynihan says:

"Surgical intervention is rarely needed in cases of hæmorrhage from acute gastric or duodenal ulcer. When it is called for, gastro-enterostomy speedily performed is the surest means of arresting the hæmorrhage. A search for the bleeding point is futile, and harmful, and unnecessary. Search for and local treatment of the ulcer or the ulcers is not necessary. A gastro-enterostomy will without doubt prevent recurrence of the hæmorrhage, and lead to a rapid healing of the ulcer from which the blood has come."

Robson says:

"If no ulcer be found anywhere, and the bleeding proves to be capillary, or from small undiscoverable ulcers, gastro-enterostomy should be performed; but if an ulcer be discovered, and it be possible to excise it, that operation should be done, as it undoubtedly offers the likeliest method of cure."

And again, in speaking of an acute case, he says:

"Case V illustrates the feasibility of exploring the stomach, even in a patient brought very low by excessive loss of blood, and although the ligature of the chief bleeding point was effected, it was deemed advisable to secure rest for the stomach by performing a posterior gastro-enterostomy, especially as it could be done without materially prolonging the operation."

The ideas expressed in the first quotation, that a search for the bleeding point is futile, harmful, and unnecessary, because a gastro-enterostomy will, without doubt, prevent recurrence of the hæmorrhage, has apparently been gaining headway. But that the assertions are hardly in accordance with the facts can be seen from the Case V of Robson's series, and many others in the literature.

To emphasize the conflicting opinions, I will quote the following extracts:

MOULLIN. "In every case in which it is practicable, I am strongly in favor of dealing with the ulcer directly in preference to performing a gastrojejunostomy."

Buck. "An operation for acute hæmatemesis, whether from an acute or chronic ulcer, seems to me to be an emergency operation, in which one would not feel satisfied unless one performed that for which the operation was undertaken, and secured the bleeding point."

BUTLIN. "The best plan is to open the stomach, and if the bleeding

point cannot be found, then to do gastro-enterostomy; but to operate on the bleeding point is the best surgery."

HABERSHON could not see how gastro-enterostomy could check the hæmatemesis when the ulcer was far from the pylorus.

Symonos considers the operation certainly to be indicated when the ulcer is situated near the pylorus, but to be of doubtful advantage when the lesion was elsewhere.

HAYEM found that the subsequent histories of patients upon whom gastro-enterostomy had been done for simple ulcer showed that there is very likely to be a return of symptoms, with hæmatemesis, gastric crises, or perforation. These symptoms, in his opinion, being due to the formation of new ulcers, or, more rarely, to carcinomatous changes in the old ulcer.

That gastro-enterostomy does not, without doubt, prevent recurrence of the hæmorrhage will be proven by the case reported with this article, and by others collected from the literature.

These cases are, in brief, as follows:

SAVANARIAUD noted reports of two cases in which the patients vomited blood after the operation of gastro-enterostomy.

The first by Roux. Patient had hæmatemesis for some time before the operation. The evening of the same day, and the next day, considerable blood was vomited. Ultimate recovery.

The second by Porge, who did gastro-enterostomy for a tumor which obliterated the pylorus. On the fifth day after the operation the patient died. Autopsy found the intestine full of blood; a recent ulcer in the vicinity of the common duct had caused the hæmorrhage.

RYDYGIER says, "Cases are known where an hæmatemesis has killed the patient, notwithstanding a gastro-enterostomy that had been made before." And that he has met with one such case in his experience.

L. Frank cites the case of an ulcer at the lesser curvature adherent to the liver, in which he did gastro-enterostomy en Y. Patient did well for four days, and then had a return of the hæmatemesis and died. Autopsy showed two ulcers; an open artery was found in the base of one, from which the bleeding undoubtedly came.

Kocher says, "That these methods (pyloroplasty and gastro-enterostomy) lead to healing has been proven, but not always. I have seen, after an uneventful recovery of a gastro-enterostomy, a hæmorrhage from an ulcer lead rapidly to death."

Peterson reports a case of gastro-enterostomy performed for hæmorrhage. "Ten weeks after this operation the patient died from hæmorrhage from the stomach, which very likely came not from an ulcer but from the parenchyma."

Korte mentions one case (out of seventeen operated upon while the

ulcer was "open") in which the hæmorrhage continued after the performance of a gastro-enterostomy.

According to A. T. Cabot, "Korte reports two fatal cases of hæmorrhage from uleers eight and twelve days after gastro-enterostomy." But from a eareful search of Korte's contributions to the subject in different publications, we have been unable to find the second case, but did find a case of operation for hæmorrhage in which gastrotomy was performed, and the uleer, near the lesser curvature, cauterized with the Paquelin. Death in this instance occurred on the eighth day from a recurrence of the hæmorrhage.

A. W. Morton reports a case of acute hæmatemesis; at operation no evidence of ulcer was found by an examination of the external surface of the stomach. Therefore he did an anterior gastro-enterostomy. Death occurred on the second day. At autopsy there was found to be no peritonitis, button well taken, considerable blood in stomach and bowels. Two large ulcers on the posterior wall of the stomach.

Robson cites a case, which possibly had better be differentiated from the others, because it was thought to be one of carcinoma; but as the differentiation of ulcer from eareinoma in this class of eases is at times most difficult, and as it is interesting, in showing the influence, or lack of influence, of gastro-enterostomy upon hæmatemesis of a possible ear-cinomatous origin, a brief synopsis of the case is here appended.

Woman, forty-two years of age, gave a history of five attacks of severe and alarming hæmatemesis. At operation found a tumor of the pylorus, with so many enlarged glands that, had it been malignant, its removal would have been useless; in consequence, a gastro-enterostomy was done. Recovery from the operation was uneventful. But at the end of a month, while sitting up, husband reading to her, she suddenly collapsed and died within a quarter of an hour; profuse hæmorrhage was evidently the cause of death. Blood oozed from the anus. No autopsy. It was thought that the carcinoma or the ulcer invaded either the portal vein or the vena cava.

The AUTHOR'S CASE is in brief as follows:

Acute, non-symptomatic, repeated hæmatemesis. With the exception of an attack of typhoid fever one year ago, previous and personal history negative.

On June 9, 1903, while in apparent health, vomited about two pints of bright red blood.

On the 10th, at about the same time of the day, had a similar attack of hæmatemesis.

On the 12th, two hæmorrhages occurred, of about a pint each, one in the morning and one in the evening.

On the morning of the 13th, another hæmorrhage took place. As medical treatment seemed to be of no avail, and as it was

feared that another hæmorrhage might prove fatal, it was decided to operate.

An examination of the external surface of the stomach gave no clue as to the location, nor the character of the bleeding point. And as a hasty examination of the mucosa failed to reveal the point, an anterior gastro-enterostomy was performed.

Patient did nicely for two days, and then became weaker, no vomiting, but blood passed from the bowel. Death occurred on the morning of the fifth day.

Autopsy revealed the site of the anastomosis intact and watertight; no peritonitis; the stomach and bowel contained considerable blood.

After removing and opening the stomach, a typical round ulcer, one-half by one-fourth inch in dimensions, was found on the anterior wall, near the pylorus and the lesser curvature.

Microscopic examination showed an eroded artery at the base of the ulcer.

As showing the necessity of direct operation, in some cases which cannot be determined upon without an examination, may be cited the case of Kocher, where the hæmorrhage originated from an ulcer, embedded in which was a cherrystone.

The futility of gastro-enterostomy in such a case is very evident.

The fact that gastro-enterostomy may have little or no influence, as a hæmostatic measure, upon gastric or duodenal hæmorrhage is well emphasized by Eccles case, in which gastro-enterostomy was performed for non-malignant pyloric obstruction. The patient did well till the eleventh day, when he vomited blood, and died on the fourteenth day, after a profuse hæmatemesis.

At autopsy, the anastomosis was found to be perfect and patent. The hæmorrhage had evidently originated from an ulcer of the duodenum which had eroded the hepatic artery.

These cases tend to show that gastro-enterostomy is but an indirect and unreliable method of dealing with bleeding from the stomach; and while it has, in many cases, been followed by a cessation of the hæmorrhage, and eventually a healing of the ulcer, it cannot be relied upon with any sense of security to stop the hæmorrhage in all cases.

Moullin, in speaking of this operation in this connection, says, "It is at best only a way of evading difficulties which are better met directly, before they have attained dimensions which render this impracticable."

And this statement will be found to be well fortified by the discussion of a recent article of Munro's, in which there is related five cases of gastric surgery, as follows:

- 1. Hæmorrhage, gastro-enterostomy, recovery from operation, death twenty months later, from cancer which probably existed at the time of the operation.
- 2. Hæmorrhage and dilatation, gastro-enterostomy, with entero-enterostomy, death with circular vomiting, sixteen days after operation.
- 3. Hæmorrhage and dilatation, gastro-enterostomy, entero-enterostomy, death within thirty-six hours.
- 4. Hæmorrhage and dilatation, excision of ulcer. Recovery, well two years after operation.
- 5. Hæmorrhage and dilatation, gastro-enterostomy. Recovery from operation, death one month after, due to colloid cancer.

The fact that in this series of four gastro-enterostomies two recovered from the operation, to subsequently succumb to carcinoma, should at least impress upon us the advisability of a more thorough search, and, if practicable, an attempt to prevent such a sequel.

In attempting to outline the indications for the operation of gastro-enterostomy in hæmatemesis, it may be stated that a thorough, faithful, and judicious search fails to reveal the source of the hæmorrhage; or if it is found and the conditions will not allow of one of the direct methods to be employed, then gastro-enterostomy may be performed.

This thorough search will add but little to the severity of the operation, as the examination of the internal aspect of the stomach can be made through the opening which is to be used in the gastro-enterostomy, if it is located at the lower portion of the greater curvature.

The question as to the advisability of supplementing one

of the direct methods by a gastro-enterostomy is not, as yet, settled.

The object of this additional step is to place the stomach at rest, and in this way favor the healing of the wound made by the direct interference. Also to act as a prophylactic measure, and to remove what is thought to be a cause of ulcer, hyperacidity and imperfect drainage of the stomach contents. Where there is marked dilatation, and other symptoms of ulcer, with the hæmorrhage, such an additional operation will usually be employed, if, in the operator's opinion, the condition of the patient will warrant it.

The performance of a gastro-enterostomy after radical treatment of the bleeding point will not add materially to the operation, as the anastomosis may be made at the opening in the stomach which was used for the exploration. But, on the other hand, the routine addition of gastro-enterostomy to direct treatment will undoubtedly increase the time and the severity of the operation to a greater or less extent.

The so-called "vicious circle," while markedly diminishing in frequency, is still occasionally encountered, even if the opening is placed at the most dependent portion of the stomach.

Ulcer of the duodenum, perforating or giving rise to hæmorrhage, following gastro-enterostomy, has occurred so frequently as to make it appear possible that such an accident might be more than a mere coincidence; and that gastro-enterostomy may be found to act as a causative factor has been suggested, and the question is under investigation. In 1900, Steinhall collected five such cases.

Peptic ulcer of the jejunum has also been described as a result of the abnormal condition caused by gastro-enterostomy. Brodnitz collected fifteen cases of this character in 1903.

All of these points should make us want sufficient evidence as to the necessity of gastro-enterostomy as a supplementary operation before it be accepted as a routine measure.

To recapitulate. Gastro-enterostomy is indicated in hæmatemesis,—First, after a thorough search has failed to reveal the source of the hæmorrhage; second, where the

source of the bleeding is discovered, but in such condition as to make direct treatment impracticable or impossible.

From a sad experience, and a review of the literature, we would, in conclusion, discountenance the idea, which has become quite prevalent, that nothing is to be gained by searching for the bleeding point, as gastro-enterostomy is all that will be necessary to prevent recurrence of the hæmorrhage.

POSTOPERATIVE INTESTINAL OBSTRUCTION.1

WITH A REPORT OF THREE CASES.

BY CHARLES H. PECK, M.D.,

OF NEW YORK CITY,

Surgeon to the French Hospital; Assistant Surgeon to Roosevelt Hospital.

From a study of the cases which form the basis of these remarks and of others of which the writer has personal knowledge; of cases recently presented before this Society and the Surgical Section of the Academy of Medicine, and of cases recently reported, which a brief and imperfect search of the literature has revealed, the writer has been impressed with the fact that postoperative intestinal obstruction is a condition the frequency of which is hardly appreciated, and the gravity of which cannot be overestimated. Three years ago, Dr. Hotchkiss read a paper before the New York Surgical Society reporting three cases successfully operated upon, and collected twenty other cases which had been reported to the Society since 1893. Of these, eighteen had been operated upon with eleven recoveries; one had yielded to vigorous abdominal massage under chloroform while the patient was held up by the heels (Briddon), and one recovered after the formation of an artificial anus (Wyeth). Warren reports a case of obstruction from a band extending from the appendicular site to the peripheral surface of a loop of gut, constricting another loop of gut beneath it; operated upon January 29, 1903, with recovery, the original operation having been performed June 14, 1902 (six and a half months before), for gangrenous appendicitis with progredient peritonitis. He states that this is the only case of this kind that he has had in his own operative work, a statement that I think few surgeons of his wide experience could make to-day. In addition to the three cases

¹ Read before the New York Surgical Society, May 11, 1904.

reported in this paper, the writer has personal knowledge of three unreported cases which resulted fatally, two following operations for appendicitis with peritonitis at intervals of four weeks and one year respectively, both operated upon for the obstruction; the third following salpingectomy closed without drainage, obstruction occurring two weeks later and death without secondary operation. In addition to the six cases mentioned, in five of which operation was performed and the condition verified, the writer has personally treated three other cases successfully by palliative measures, i.e., repeated enemata, etc., one of these having had absolute obstruction for forty-eight hours with vomiting and distention when first seen, operation for suppurative appendicitis having been performed by another surgeon seven weeks previously; the case had been constantly under the care of a competent trained nurse, whose efforts to relieve the obstruction had been unavailing. Only the fact that the case was seen in a small country village late at night, and the impossibility of securing suitable assistance, deterred the writer from operating immediately, and constrained him to spend the greater part of the night in efforts at relief by enemata, position, etc., which fortunately were finally successful, and the patient reported more than a year later that there had never been any return of the symptoms. In these cases yielding to palliative means, there is no verification, of course, of the condition actually existing. It is frequently stated that the majority of cases of postoperative obstruction occur within the first two weeks or so following the primary operation, and this statement seems fairly well substantiated; the percentage of cases following this rule, however, is difficult to estimate, and many occur later. It is in these earlier cases that palliative and prophylactic treatment should give the best results, and in which often the risk and difficulty of the secondary operation are greatest. During the early convalescence from laparotomy for extensive inflammatory trouble, the coils of intestines are usually matted together by peritoneal exudate and adhesions more or less firmly, according to the time which has elapsed; during

the first few days the adhesions are soft and easily separated; later, say from two to four weeks, they may be firm enough to cause great difficulty in finding an obstruction and freeing the coils, as is well illustrated in a case recently reported by Deaver, where secondary operation for obstruction was performed thirteen days after operation for appendicitis with peritonitis. Many adhesions were broken up and the obstruction found in a tangle of coils of the lower ileum; much damage to peritoneal surfaces occurred, partially repaired with cargile membrane; eight days later a third operation was performed, 500 cubic centimetres of thin pus in pelvis with adhesions worse than ever and obstruction in the sigmoid; ultimate recovery. The great additional trauma necessarily inflicted at the second operation was undoubtedly responsible for the fresh infection and increase in adhesions. The same author states that he operated upon ten cases of obstruction following appendicitis in the year 1901, and that the obstruction usually occurs in the first ten to fourteen days after the primary operation. Dr. R. T. Morris stated, in a discussion of a case at the Surgical Section of the Academy, that he had been called to see a number of such cases in the early convalescence from laparotomy, but had not yet been obliged to resort to secondary operation, all his cases having yielded to vigorous palliative treatment, i.e., elevation of the hips, abdominal massage, and enemata. The point I wish to emphasize is this, that many of the early cases of obstruction are due to kinks and bends, which only partially obstruct the lumen of the bowel until an attack of indigestion, or some indiscretion in diet, produces unusual gas formation in the afferent loop; with increased peristalsis acting against the point immobilized by the adhesion, the obstruction becomes complete, and gas ceases to pass the obstructed point. The condition rapidly goes from bad to worse unless promptly relieved by proper palliative measures, as, with the rapid accumulation of gas above the obstruction, the pressure at this point becomes greater and greater, and soon fresh adhesions render the condition absolutely beyond hope of relief except by operative

procedure. It is in this class of cases, however, that early palliative treatment will many times effect a permanent cure. for the first passage of gas past the obstructed point relieves some of the pressure above; more gas and fæcal matter follow, and the temporary relief becomes permanent if similar attacks can be prevented by rigid diet and avoidance of attacks of acute indigestion for a few weeks, until further absorption of adhesions occurs and the bowel again becomes free. It is a well known fact that adhesions formed between the intestines, as a result of operative procedures or inflammatory conditions, have a marked tendency to disappear in the course of time, the absorption and disappearance being greatly favored by the constant peristaltic movements of the intestines. I have opened the abdomen for ventral hernia two years after resection of intestine for gangrene accompanied by extensive peritonitis, where at the original operation packing was used, a temporary fæcal fistula developed, and extensive adhesions must inevitably have been present, and found at the secondary operation the intestines absolutely free from adhesions and the point of anastomosis indistinguishable, a few adhesions of the omentum to the parietes being the only remaining evidence of the former peritonitis. I have seen the abdomen opened for intestinal obstruction five years after laparotomy for extensive peritonitis of pelvic origin, with the use of quantities of gauze packing for drainage; the greater portion of the small intestine formed a globular mass the external surface of which was perfectly smooth, free from adhesions, and covered by normal peritoneum, the coils forming the mass being bound together by firm, old adhesions which prevented the motion which should have absorbed and freed the attachment of the coils from each other, in the manner in which the external surface of the mass, as a whole, and the other abdominal organs had been freed. Unravelling of the coils forming the mass resulted in a prompt recovery. Entanglement of coils in adhesions which will soon be absorbed if obstruction can be avoided for a few weeks, and the normal peristaltic movement of the bowel has an opportunity to do

its work, is nevertheless a condition of grave danger while it lasts: and it is of the utmost importance that all patients having been operated upon for inflammatory intra-abdominal conditions should be carefully watched during the first few weeks of convalescence, limited to a very simple diet, and have the bowels regulated with the greatest care by enemata or mild laxatives. They should be warned of the possibility of the occurrence of obstruction, and the slightest indication of constipation with colicky pain be promptly attended to. however, properly conducted palliative treatment in these early cases of obstruction fails to give relief within a very few hours, delay in operating cannot be too severely condemned, for each hour of unnecessary delay adds greatly to the perils of the operation, and lessens the chance of a favorable outcome. The later obstructions, as a rule, present an entirely different condition, as two of my own cases show: the bands are of strong, well organized connective tissue, or loops of gut are bound down by firm organized adhesions in such a manner that they act as bands constricting other loops of gut beneath In attacks occurring later than four to six weeks after the primary operation, the chances are greatly in favor of the obstruction being due to well-organized bands, or dense adhesions; and the hope of relief by palliative measures is much less than in the early cases. These cases also have, as a rule, passed out of the hands of the surgeon, and the symptoms of beginning obstruction do not generally receive as prompt attention as in the case of patients still in bed from the effect of the primary operation, many cases having reached this stage of marked distention, fæcal vomiting, and collapse when first seen, as in my third case. Attempts at palliative treatment in these late cases, even if seen at the commencement, should be very brief indeed, for not only are the bands or adhesions likely to be unyielding and firmly organized, but many of the original adhesions have probably been absorbed, and the obstruction easier of access than would be the case soon after the primary operation. The conditions most frequently followed by postoperative obstruction are, first, appen-

dicitis with peritonitis either localized or diffuse, the danger of obstruction being, as a rule, in proportion to the extent of peritoneal surface damaged and the amount of resulting adhesions. The amount of drainage used is another factor of great importance, for extensive gauze packing has undoubtedly been responsible for many cases of obstruction, more especially those cases following soon after the primary opera-tion. Many cases occur, however, where little or no drainage has been used, as my own cases will show, two of them having been closed without drainage, and in the third the adhesions responsible for the obstruction were far from the site where drainage was employed. Nevertheless, the use of small incisions, the minimum amount of handling of the intestines and evisceration, the abandonment of gauze packing, substituting cigarette drains down to the stump of appendix or merely through the abdominal wall; methods so strongly advocated by Hotchkiss, Blake, Morris, and others should have a decided tendency to diminish the number of cases of postoperative obstruction. Secondary abscesses following suppurative peritonitis are sometimes the cause of obstruction, although it is rarely, if ever, due to the pressure of the abscess itself on intestinal coils, but rather to the zone of surrounding adhesions. That it may follow an operation for non-suppurative or interval appendicitis closed without drainage is shown by one of my own cases; but this is probably quite rare, unless adhesions existed and the exposure and trauma of peritoneal surfaces at the primary operation were considerable. purative conditions of the female pelvic organs are probably the next most prolific source of postoperative obstruction. Here the amount of damage to peritoneal surfaces is often extensive, and coils of intestine dropping back into the pelvis become cemented together, and to the pelvic walls and viscera, forming a most difficult condition to deal with if obstruction Inflammations of the gall-bladder or stomach are less frequent but occasional causes. The symptoms are the usual ones of an acute obstruction,—colicky pain, vomiting, distention, and prostration; and the diagnosis is usually clear

except in cases which may simulate or be complicated with a spreading peritonitis following immediately upon the primary operation. It is altogether probable that some deaths attributed to postoperative peritonitis are actually due to mechanical obstruction, especially in the cases where large quantities of gauze packing are employed; in many of these cases both conditions exist simultaneously, and it is impossible to distinguish between the two. Such cases are, as a rule, unfavorable for secondary operation, as the discouraging results of the secondary operation for postoperative peritonitis are well known. It is this class of cases that the enterostomy recommended by Finney and Pancoast may at times be indicated, giving temporary relief without attempting to search for the site of obstruction. In cases following operation for appendicitis, if the original wound is healed, the best incision is probably the Kammerer through the right rectus sheath, as the obstruction is located in the majority of cases in the right lower quadrant of the abdomen. If there is still a suppurating sinus in this region, it should be cleansed thoroughly with hydrogen peroxide or swabbed with a saturated solution of permanganate of potash, and then sealed with a collodion dressing or adhesive rubber dam, and a median incision made. The site of obstruction should be reached with as little evisceration as possible, as handling of greatly distended intestines adds much to the operative shock, and often hastens an early fatal issue. It is preferable in certain cases of great distention to draw a single loop out of the wound, incise it with proper protection of the surrounding operative area, evacuate as much gas and fluid fæces as possible, suture with two tiers of continuous silk Lembert stitches, cleanse with peroxide and flush with salt solution, and return to the abdomen, repeating the process on two or more loops if necessary, until the search for the obstructed point is successful. When found, each case presents its own indications for treatment; adhesions, kinks, and bends are freed, and intestinal contents allowed to pass into the collapsed portion of the gut below the obstruction. If this portion distends freely and

no lower obstruction exists, the abdomen may be closed at once. Bands are divided and the gut wall at the point of obstruction carefully inspected; if damaged so as to endanger perforation, or gangrenous, immediate resection with end-to-end anastomosis, or the formation of an artificial anus, are the two alternatives presented: preference should be given to the anastomosis in the majority of cases; the additional time and shock required for the adjustment of a Murphy button as compared with the formation of an artificial anus should be inconsiderable in the hands of skilled operators, and the ultimate danger to the patient is greatly lessened. there has been much trauma in the separation of adhesions, etc., with considerable oozing or soiling of the peritoneal surface, the abdomen should be freely flushed with hot salt solution, otherwise it should be omitted and the abdomen closed at once. Drainage is rarely required, except in cases of resection where the viability of the gut wall or the perfection of technique is in question, when a cigarette drain may be placed down to the point of anastomosis.

In cases following operation for pyosalpingitis or pelvic inflammation, the incision should always be median, with perhaps the use of the Trendelenburg position as in the original In other respects the technique is the same. Patients should be put to bed with the head elevated (Fowler position), and rectal irrigations or high enemata given every three hours until a satisfactory effect is secured in the passage of gas and fæcal matter. No cathartic should be given until after the distention has been thoroughly relieved from below. External heat, stimulants, etc., as for other cases of shock. If vomiting persists, lavage should be used. The following three cases illustrate some of the conditions found at varying lengths of time after the primary operation. In Case II, at eight days, the adhesions were soft and easily separated, but involved all the coils in the pelvis; the obstruction, a knuckle of gut doubled upon itself in Douglas cul-de-sac, was quickly found and easily relieved. In Case I, at five weeks, many of the original adhesions had already been absorbed, and those

that remained were quite firm and difficult to separate. In Case III, at eleven months, one strong, well-organized band of connective tissue was the only intraperitoneal evidence of the former operation.

CASE I.—C. S., aged ten years. Patient had been ill for five days with abdominal symptoms which were diagnosed as colitis until seen by Drs. Raymond and Tyler, of New Rochelle, on the morning of September 4, 1902, when appendicitis was diagnosed and immediate operation advised. Later in the day she was brought to New Rochelle Hospital, and prepared for operation. When first seen by the writer the same afternoon the abdomen was distended, there was extreme general tenderness and rigidity, most marked, however, in the right iliac region; temperature, 102.5° F.; pulse, 140. Ether was given, and a 2.5 inch oblique incision made in the right iliac region; on opening the peritoneum, a large amount of thin seropus escaped, chiefly from the pelvis and lower abdomen, the right iliac fossa, and the region to the right of the ascending colon as high as the liver. There were apparently no limiting adhesions. Peritoneal cavity was then protected with gauze pads, and a large retrocæcal collection of fœtid pus evacuated; the stump of the appendix lay in the wall of the abscess cavity and was ligated, the major portion of the organ having sloughed away. All areas were thoroughly cleansed, and cigarette drains carried into pelvis up towards liver and into abscess cavity at stump of appendix. Time, thirty minutes; condition, poor. The patient was not seen again by the writer until October 9, 1902, thirty-five days after the operation described. She had made good recovery, the wound having healed except for a shallow sinus in abdominal wall. Her general condition had greatly improved and her appetite had become ravenous. On October 7 she began to vomit and her abdomen became somewhat distended; gas and some fæcal matter, however, were passed. On October 8 the obstruction was evidently increasing in spite of repeated enemata, and by the morning of October 9 had become complete; vomiting constant but not fæcal, pulse rapid, weak, and irregular, and general condition poor. Distention had increased steadily, was central, and not extreme. Under light ether anæsthesia a three-inch median incision was made below the umbilicus; small intestine distended to the size of a man's forearm presented, and a short

search disclosed the part below the obstruction completely collapsed, the large intestine also being empty. The gut was rapidly traced until the point of obstruction was revealed; it proved to be a coil of ileum attached to the left upper portion of the posterior abdominal wall, near the lower end of spleen and splenic flexure, forming a tense cord between this point and the ileocæcal junction, beneath which a double coil of small intestine was constricted in such a manner that the upper portion alone was distended (i.e., a high obstruction, in the jejunum). The adhesion was separated with some difficulty, and a coil of ileum adherent near the hepatic flexure also freed; the intestine rapidly inspected, the abdomen flushed with salt solution, and closed by layers in the usual manner without drainage. Gas and some fæcal matter passed within the first few hours, vomiting continued at intervals for about fortyeight hours, diminishing gradually, at the end of which time good movements of the bowels were obtained and further convalescence was uneventful.

CASE II.—Mme. L. C., aged thirty-four years. Patient was operated upon August 27, 1898, for suppurating hydronephrosis, nephrectomy of right kidney being performed. She developed ether pneumonia after the operation, and had a high percentage of albumen in the urine from the other kidney for some time, but finally recovered. Since that time she has had one child at term now alive and well, and several miscarriages, the last three days before her admission to the French Hospital on March 19, 1902, when she was curetted for retained secundines. Examination under the anæsthesia at that time showed a double tubal enlargement, and twelve days later (March 30, 1902) laparotomy was performed. Both tubes contained pus and with the ovaries, which were involved and adherent, were removed. As the vermiform appendix was attached to the right tube and secondarily inflamed, it was removed and the stump inverted. The operative field was cleansed with salt solution and the abdomen closed without drainage. The patient reacted nicely, passed sufficient urine, which was not albuminous; bowels moved freely on the third day; temperature and pulse were normal, and convalescence seemed well established. No further movement of the bowels occurred, however, and on the fifth day she began to show signs of intestinal obstruction; repeated enemata were ineffectual, vomiting persisted and became fæcal, the pulse became rapid and weak, and on the

seventh day her condition seemed so desperate that operation seemed inadvisable. The writer wishes to state that on the fifth day after the operation he left the city, supposing the patient to be convalescing and out of danger, and knew nothing of the obstruction until the seventh day, when on his return he found the condition as described. During the next twenty-four hours, in spite of the fact that there was no relief of the obstruction whatever, the vomiting became less frequent, and the general condition improved sufficiently to warrant an attempt at surgical relief, and on the eighth day after the salpingectomy the abdomen was reopened under chloroform anæsthesia.

Enormously distended coils of small intestines presented in the wound, the large intestine being empty; after a short search the site of the obstruction was found low in the ileum, a knuckle of the gut in the pelvis being sharply angulated and constricted by a band of adhesions. The adhesions were quickly freed, the gut straightened, and its contents forced into the collapsed portion. The abdomen was flushed out with salt solution and closed without drainage; time about thirty minutes. Rectal irrigations of hot saline solution were given every three hours; the passage of gas and fæcal matter occurred, and the patient began to improve. From that time recovery was uneventful.

CASE III.—A. T., aged twenty-one years. Admitted to Roosevelt Hospital, March 13, 1903, suffering with a mild attack of appendicitis of two days' duration, the third attack within a year, all mild in character and of one to three days' duration. Had not been confined to bed by any of the attacks. operated upon by the House Surgeon the following day (March 14, 1903) by an intermuscular incision; appendix thick, congested, somewhat adherent at the tip, base covered with peritoneal reflections. The appendix was removed in the usual manner, its base inverted with a purse-string suture of chromic gut, with an additional Lembert suture. The abdomen was closed without drainage in the usual way. The wound healed per primam. Sutures all removed on the eighth day, patient sat up on the eleventh day, and left hospital well on the thirteenth day. remained well until three days before his readmission, on February 14, 1904, on the service of Dr. Weir, when, without apparent cause, he began to vomit, and could not retain anything on his stomach. He also began to have general abdominal pain and dis-

tention, and his symptoms grew steadily worse up to the time of his admission. His bowels had not moved for four days, the vomiting was fæcal in character, and he was much prostrated. The abdomen was distended, tympanitic, moderate general tenderness, expression anxious. Operation was performed at 10 P.M. under light ether anæsthesia. A four-inch median incision below umbilicus; greatly distended coils of small intestine presented in the wound, dark and congested, so tense that the peritoneal coat cracked in places on handling. After a short search the point of constriction was found a few feet from the ileocæcal valve, the gut below being collapsed and empty, as was the large intestine. The obstruction was caused by a dense, narrow band of fibrous tissue passing between two coils of intestine in such a manner that it almost completely surrounded the gut at one point, causing complete obstruction. The band had no apparent connection with the cæcum. It was divided, a weak spot in the gut wall at the point of constriction protected with Lembert sutures, and the attempt made to return the intestines to the abdominal cavity. could not be accomplished until the gut had been incised in two places, allowing the escape of a large quantity of gas and facal matter. These incisions were closed with two tiers of Lembert sutures. The peritoneal cavity was irrigated with salt solution and the abdomen closed without drainage. The patient's condition was extremely critical; he was infused upon the table, but did not react from the shock, and died at 2 A.M.

Conclusions.—The possibility of postoperative obstruction should be borne in mind in all abdominal operations, especially in conditions likely to result in extensive adhesions, e.g., appendicitis with peritonitis; pyosalpingitis with pelvic peritonitis. All raw surfaces should be covered as much as possible with normal peritoneum, or, where this is not practicable, perhaps with cargile membrane, or carefully arranged omentum. Small incisions and the least possible manipulation and evisceration should be the rule. The cleansing of the peritoneum should be done rapidly and with the least possible trauma and handling of normal peritoneum. Flushing with hot saline solution is advisable where there is much foreign material to be removed. The smallest possible drains should

be used, if any; cigarette drains are preferable to gauze, as they are less irritating to the surrounding peritoneum; cases of pyosalpingitis or pelvic peritonitis rarely require drainage, and, when necessary, drainage through the cul-de-sac can usually be employed. Diet and regulation of the bowels should be watched with the greatest care during the first few weeks of convalescence; attacks of gaseous indigestion with colicky pain should be regarded with suspicion and treated promptly and vigorously. Determined effort should be made to relieve early attacks of obstruction by enemata, position, gastric lavage, etc., and if successful, patient should be kept on a scanty fluid diet for some time and watched most carefully for possible recurrence of symptoms. If palliative measures are unsuccessful after a few hours' trial, operation should be promptly resorted to. In cases occurring later than four to six weeks, palliative measures are less likely to be effective, and early operation is usually imperative. All patients who have been operated upon for intra-abdominal inflammatory troubles should be warned of the possibility of the occurrence of obstruction before leaving the care of the surgeon, impressed with the importance of avoiding indiscretions in diet and attacks of indigestion, and of seeking advice promptly if such attacks should occur. The operative procedure must be adapted to each individual case; the right Kammerer incision for cases following appendicitis with complete healing is often useful; the median incision, as a rule, for other con-Resection and end-to-end anastomosis should be preferred to enterostomy in the majority of cases where gangrene or sloughing of the gut wall demands one or the other.

MESOSIGMOIDITIS, AND ITS RELATIONS TO RE-CURRENT VOLVULUS OF THE SIGMOID FLEXURE.

BY EMIL RIES, M.D., OF CHICAGO.

Volvulus of the sigmoid flexure has long been known as a pathological and clinical entity. The cases of death caused by this form of intestinal obstruction have been numerous in the days when abdominal surgery had not attained to its present In fact, pronounced cases of volvulus of the sigmoid practically all died under medical treatment, while according to the latest reports as much as two-thirds of the cases operated on during the attack have been saved. Statistics, however, are of comparatively little value in a consideration of this subject, as the methods employed, and the time when they were employed, vary to such an extent in the hands of various operators, that it is useless to try to draw conclusions from a simple statistical collection of cases reported. But the pathology and the clinical course of these cases have come to be so well understood that there is very little doubt as to what treatment is the most rational one.

Volvulus of the sigmoid used to be discussed as a form of intestinal obstruction, but the discussion has gained infinitely in depth and results, since associated conditions have been duly recognized, which oblige us now to connect volvulus of the sigmoid with a considerable number of closely related pathological changes in the abdominal and pelvic viscera.

As a basis of this discussion, I may relate a case which I operated on some time ago.

History of the Case.—B. H. M., male, forty-three years old, machinist, born in Germany. Patient has had typhoid fever thirty years ago, rheumatism in the knee ten years ago, soft chancre five

years ago. In 1892 he noticed discharge of pus and blood from the rectum, and was operated on by Dr. M. for hæmorrhoids. He was better for six months, then began to notice pain in the region of the sacrum, which has continued ever since. In 1899 he was operated on by Dr. F. for hæmorrhoids and a small ulcer. Again he improved for six months. But the pain over the sacrum soon increased again. For seven or eight years patient now and then had nausea, depending more or less on the food ingested. At times the nausea would lead to vomiting of water and bile, never blood. The abdomen was often noticed to be bloated, particularly so during the last month. After the meteorism and the nausea and vomiting have lasted a few days, patient discharged suddenly large quantities of gas and fæcal matter, then watery stools, and, later, hard scybala. Then great relief followed temporarily. Since the last operation patient has not passed any blood, but he has noticed pus and mucus repeatedly, especially after a hard passage. Appetite was always good. Patient lost some six pounds in the last year, present weight is not quite 172 pounds.

Patient complains now of a pulling, burning, and bearing-down sensation over the sacrum and coccyx. This sensation is relieved when he pushes the anus upward.

This history indicated an obstacle to the fæcal passage, probably in the lower bowel, as the vomiting was never copious or excessive or fæcal in character. The presence of pus and mucus in the bowel movements indicated some ulcerative process, also probably low down. The fact that patient felt complete relief at times would speak in favor of a benign obstacle, though the age of the patient was a point in favor of a malignant neoplasm. As blood had not appeared in the stools since the hæmorrhoids had been operated on, I was inclined to exclude malignant neoplasm, because the time since the last hæmorrhoid operation was almost five years. If a malignant neoplasm had been the cause of the patient's passing blood and pus, he would not have survived for that length of time.

The examination of the patient revealed the following status: Patient is tall, strongly built, muscular. His descriptions of his trouble suggest neurasthenia. Temperature, 99° F. Heart, lungs, liver, spleen, kidneys, glands negative. Urine normal. Anus and rectum normal to palpation and inspection. High up a diffuse infiltration of the paraproctic tissue is to be felt. In the

abdomen a pear-shaped tumor of the size of a child's head is palpated. It is slightly tender to the touch. Its narrow end is in the left iliac fossa, while its rounded extremity reaches towards the right side beyond the median line. There is a tympanitic sound on percussion over it. It is moderately movable. Stomach and intestines are not dilated.

On examination under anæsthesia (February 13, 1904), during the manipulation of the tumor through the abdominal walls a large amount of gas and soft fæces intimately mixed with mucus is evacuated, whereupon the tumor disappears completely.

The location of the tumor, its shape, its mobility, the slight amount of pain over it, the absolutely normal condition of all other parts of the intestinal tract, as far as could be determined by clinical examination, particularly, however, the fact that during manipulation the tumor disappeared after evacuation of a considerable amount of soft fæcal matter with large amounts of mucus and gas,-all this obliged us to make a diagnosis of volvulus of the sigmoid flexure, which had been redressed by the manipulation under anæsthesia. The patient's complaint of a tugging and pulling sensation in the region of the coccyx could be explained as due to a pulling on the rectum, produced by the rectum being wound up, if I may say so, by the twist of the sigmoid. But the fact that this tugging sensation was present not only when the patient had the nausea and vomiting, but more or less constantly; furthermore, the very fact that the nausea and vomiting occurred in spells, between which the patient felt complete relief, indicated that we had to deal with a combination of two processes, one recurrent and one stationary, the first the volvulus of the sigmoid, the second a condition which favors the occurrence and recurrence of the first.

A chronic inflammatory condition of the mesosigmoid leading to the formation of scar tissue in and retraction of the mesosigmoid is found associated with the volvulus (whether as cause or effect will be considered more closely below). This condition I expected to find on operation, and announced my diagnosis accordingly before the operation.

The operation was performed February 15, 1904, under ether anæsthesia, and lasted about twenty minutes. The abdomen was opened in the median line between umbilicus and symphysis. Immediately the sigmoid came into view with a very thick mesosigmoid. The latter presented on both surfaces white and glistening stripes of chronic peritonitis, which ramified all over it. The sigmoid was not twisted when the abdomen was opened, but a slight impulse given to the upper half of it sufficed to make it drop over the lower half. Numerous enlarged glands were felt in the mesosigmoid, the base of which was very short. There was considerable accumulation of fat in the mesosigmoid. The sigmoid itself was almost empty. No Graser's diverticula could be seen. The mesosigmoid was attached to the parietal peritoneum of the anterior and lateral abdominal wall by a number of interrupted cumol catgut sutures placed at a distance of about one inch from the sigmoid. The abdomen was closed by four layers of continuous cumol catgut sutures.

A few hours after the operation the patient had a natural bowel movement. During the convalescence the bowels moved several times every day without any laxative. Temperature and pulse remained normal (highest temperature, 99° F., with pulse at 76 on the third day). Patient walked about from the second day on. The incision healed by primary union. Patient left the hospital on March 2.

He was seen again repeatedly since the operation. On May I he reports his appetite excellent; his bowels move daily; no mucus in the passages. Some tugging and pulling are still felt over the sacrum. He has resumed his occupation and is able to attend to his duties without difficulty.

The operation and its success have therefore confirmed our diagnosis of the mesosigmoiditis, and make the latter appear fully as important as the temporary and recurrent volvulus.

From a review of the course of similar cases as reported in literature, it becomes evident that many cases never go beyond the initial stages of more or less obstinate constipation, with now and then some nausea or vomiting and pain in the abdomen. But the surgeon is rarely so fortunate as to get the patient for observation and treatment in this early stage, and I suspect that many cases belonging to this class are not recognized, if they do reach the surgeon in this stage. Usually, the surgeon is not called in until a sudden attack of

volvulus, with a more or less pronounced twist of the sigmoid, has obstructed the passage of the fæces completely.

Then the picture of ileus dominates the clinical aspect. The patient is in intense pain, vomits first stomach contents, soon fæcal matter. The bowels are distended, frequently in a very peculiar manner. The rectum is found empty and no passage can be produced. It is not necessary here to go further into the well-known signs of the complete intestinal blocking. It is necessary, however, to mention the peculiar way in which the dilatation of the intestine frequently is manifested in this particular class of obstruction. Two portions of the colon manifest a particular tendency to enlargement, one absolutely characteristic of the volvulus, the other merely indicating that the colon is blocked low down.

The characteristic distention is described as a palpable, often visible tympanitic tumor reaching from the left groin towards the region of the stomach, and representing the dilated sigmoid, which becomes erected, and the loops of which may come into close apposition.

The second dilatation, which sometimes overlaps and obscures the characteristic distention of the sigmoid, is a distention not of the portion of the colon immediately above the sigmoid, as one might expect, but of the cæcum. The cæcum under these circumstances may attain enormous dimensions. It may become as large as a man's thigh, and this may occur while the colon transversum and descendens are practically empty. This distention of the cæcum, of course, takes place only when the ileocæcal valve is absolutely tight. This condition of the cæcum is of the greatest importance, not only because the fatal perforation may take place here instead of in the sigmoid, but because it may lead to great confusion, if the operator is not aware of this peculiar condition and looks for the obstacle in the ascending colon instead of in the sigmoid.

If the volvulus of the sigmoid is not relieved, gangrene of the sigmoid, perforation, and peritonitis lead to the fatal end. But the perforation may occur in the execum before the

sigmoid bursts, or ulcerations in the descending colon above the volvulus may perforate and give rise to the fatal peritonitis.

It might be expected that the volvulus would be the more dangerous the more the sigmoid is twisted, that is, that a twist of 360° would be more certain to lead to gangrene than a twist of only 90°. But the cases reported in literature prove abundantly that such is not the case. Cases with a torsion of only 90° have led to gangrene of the whole sigmoid and fatal perforative peritonitis in less than twenty-four hours, while in other cases a twist of 270° and more had not produced perforation or even complete gangrene in a much longer time.

This observation necessitated the search for circumstances that might increase or decrease the dangers due to the volvulus itself. The findings in the course of the operations gave satisfactory evidence of such an additional factor. This factor is the mesosigmoiditis, i.e., the chronic inflammatory condition of the mesosigmoid, which has resulted in a cicatricial shrinking of the peritoneal folds of the mesosigmoid as well as of the tissues between the folds. Wherever the cases were observed carefully, wherever the acute changes produced by gangrene and peritonitis allowed of such observations, this chronic retractive process in the mesosigmoid has been found. White stripes of scar tissue branch out over both sides of the mesosigmoid, make it rigid and hard. The retraction peculiar to all scar tissue tends to shrivel up the mesosigmoid. The cicatricial hardening is not limited to the peritoneal folds, but the whole substance of the mesosigmoid loses its soft, pliable condition and becomes hard and stiff like felt, as could be well observed in the case described here. An observation which I have not found recorded in literature, but which was perfectly established in our case, was that of enlarged and hard glands throughout the mesosigmoid.

This cicatricial degeneration of the mesosigmoid elucidates as much as it complicates the course of volvulus of the sigmoid. It is evident that the more scar tissue there is in the substance of the mesosigmoid along and around the blood-

vessels the greater the danger of interference with the circulation. We understand, then, why, with a high degree of mesosigmoiditis, a slight degree of volvulus may lead to rapid gangrene and perforation of the sigmoid, while with a more moderate amount of interference with the circulation in the mesosigmoid even a torsion of 360° might not lead to very rapid and complete shutting off of the blood supply of the sigmoid flexure.

The importance of this mesosigmoiditis is further shown by the fact that in a number of cases the symptoms of volvulus were present and the patients died from perforative peritonitis, where there was no real volvulus, but only pronounced mesosigmoiditis (for instance, two cases reported by Kuhn). Here the shrinking of the mesosigmoid shut off the fæcal current as well as the blood circulation, and still the post-mortem showed no volvulus. In our case, also, we found no volvulus at the time of the operation, though the tumor which had been observed two days before the operation, and which had disappeared under manipulation, indicated that volvulus had been present. Still, it is possible that in our case, as well as in Kuhn's two cases and in three similar ones reported by Riedel, there existed no genuine volvulus, but rather a kink of the sigmoid produced by the shrinking of the mesosigmoid. The forms and shapes assumed by the mesosigmoid in this process of chronic inflammation and shrinking vary a great deal. While in some cases the mesosigmoid is fairly well spread out, so that the bands of cicatricial tissue are seen branching out all over it, in other cases the retraction of the shrinking connective tissue has brought the two halves of the sigmoid into such close approximation, that they lie perfectly parallel to each other in the shape of a double-barrelled gun. Besides, bands may take their course from one part of the sigmoid or mesosigmoid to other points on the bowel or the mesentery.

Gersuny describes a special band at the point where the colon descendens passes into the sigmoid. He calls this band a typical one, with a typical course running across the outer fold of the mesosigmoid. Gersuny states that this fold or

band is the cause of symptoms long before volvulus occurs. Pain in the lower part of the abdomen on both sides is attributed by him to this typical band.

Enough, I think, has been said to demonstrate the importance of this cicatricial retraction of the mesosigmoid in itself. All authors agree that it favors greatly the occurrence of volvulus by approximating the fixed points of the sigmoid. As a matter of experiment, I gave the sigmoid a slight twist in our case, when the abdomen was open, and it took only a very slight push to make the proximal end of the sigmoid fall forward and over the distal end. This experiment again favored the theory of the causation of volvulus by the mesosigmoiditis, and furthermore increased the probability that in our case we had to deal with a recurrent volvulus, not merely a kink of the sigmoid.

While the association of mesosigmoiditis with volvulus is generally accepted, the question as to which is the primary affection is not so readily decided. The fact that mesosigmoiditis has been found alone and unassociated with volvulus. and that all well observed cases of volvilus have been found associated with mesosigmoiditis, might be considered sufficient proof of the primary existence of the mesosigmoiditis. But it might be urged that a condition of recurrent volvulus of the sigmoid would tend to produce such inflammatory changes in the bowel that the mesentery would readily be affected and take part in the inflammation, and subsequently be subject to cicatricial changes. On the other hand, it is well to point out that volvulus without pathological conditions in the mesentery is not likely to occur; though it is true that Koch, for instance, describes congenital anomalies in the mesentery which might lead to volvulus as a secondary and inflammation and cicatrization of the mesosigmoid as a tertiary condition. The varieties of incomplete or abnormal development of the mesentery of the sigmoid are as numerous as the deviations from the normal in other parts of the bowel. This must lead us to a consideration of the possible causes of the mesosigmoiditis apart from the question of volvulus.

Chronic inflammatory changes of the mesentery occur in many parts of the intestinal tract. They may be associated with volvulus, as, for instance, in the mesentery of the small intestine (Philipowicz), or may occur without it, where the anatomical arrangement does not favor the occurrence of a volvulus, as, for instance,—and very frequently,—in the meso-appendix. The chronic parametritis atrophicans described by Freund,—a condition so long regarded as something extraordinary and hard to find or observe,—I consider to be analogous. In fact, I should call it the shrinking mesenteritis of the uterus, and would thereby deprive it of its isolated position in pathology and bring it closer to our understanding.

Excepting two specimens reported by Riedel, no microscopic examinations of the mesosigmoiditis are to be found. But changes identical in macroscopical aspect occur frequently in the meso-appendix, and are easily demonstrated there. The pathology is that of a newly formed and shrinking connective tissue with more or less round cell infiltration. We cannot be far from the truth in assuming that the cause is very much the same in the mesosigmoid as in the meso-appendix. In the appendix, my researches (to be published soon) have taught me that very minute ulcerative changes afford ready entrance to infection. This favors inflammatory affection of the neighboring lymphatic structures in the meso-appendix. I do not know anything about small ulcerations in the sigmoid, because sigmoids are not removed and examined fresh in such numbers as appendices.

But some recent researches of Graser's have demonstrated a possible cause of the mesosigmoiditis in the spurious diverticula which he found. Graser met these diverticula in the sigmoid in ten out of twenty-eight cases examined, proving thereby that the sigmoid is a seat of predilection for the formation of the diverticula. In early stages, these diverticula are lined with epithelium and covered by the muscularis mucosæ, and partly by the circular muscular layer, while the longitudinal layer is absent over them. They follow the paths reserved for the blood-vessels in their course through the muscular layer

in the same way as similar formations which I have demonstrated in the Fallopian tubes and in the gall-bladder. The diverticula of the bowel are usually arranged along the mesenteric border, as here the vessels enter and leave. Their formation, according to Graser, is favored by stagnation of fæcal matter in the bowel and by venous stasis in the vessels, whereby the paths of the blood-vessels, or emissaries, as Graser terms them, become widened. These diverticula often become the seats of ulcerative changes, become adherent to neighboring organs, may lead to perforation into them. In this way, for instance, perforation from the sigmoid into the bladder may occur leading to the passage of fæces through the bladder or of urine through the rectum.

In the earlier stages, before the diverticula have become large, when they have just begun to show small ulcerations, an inflammatory affection of the mesosigmoid could readily be understood as a consequence of such multiple ulcerations. It is safe to prophesy that this association of diverticular ulceration and mesosigmoiditis will be frequently discovered in the near future. In the case described above, I looked for these diverticula, but, owing to the thickened and opaque condition of the mesosigmoid, it was impossible to ascertain whether diverticula were present or not.

Besides the diverticula minute ulcerations might be suspected to occur in the sigmoid, particularly where congenital anomalies favor stagnation of fæcal matter in this organ. The lining epithelium of the bowel is now well known not to afford the complete protection against infection which we used to attribute to it. The investigation of the appendix vermiformis has largely destroyed the confidence which we used to place in the perfection of the protective fence arranged against the septic contents of the alimentary tract.

Ulcerations in neighboring parts of the bowel are known to be able to produce the same condition of mesosigmoiditis as described in cases of volvulus. A case which I operated on the same morning as the case which is the subject of this report, illustrated this very beautifully. I had to perform colostomy

on a patient with multiple fistulas in ano, almost impermeable stricture of the rectum, and ulceration of the rectum above the stricture. When I pulled up the sigmoid, typical mesosigmoiditis was found to be present, though there was no question of volvulus in this case. But the inflammatory and cicatricial hardening of the tissues, which existed around the ulcerated rectum, had extended to the mesentery of the sigmoid. I did not see any diverticula, and the mesosigmoiditis was not so extensive as it was in the case of volvulus. Still, the white bands spreading and branching over the mesosigmoid were absolutely typical.

This case of mesosigmoiditis after rectal ulceration with its extension all around the stricture and deep into the tissues of the perineum seemed to offer a further explanation of the tugging and burning pain which the volvulus patient complained of. He also presented a thickening of the tissues surrounding the rectum high up, which could be discovered by rectal palpation, and which may have originated in the small ulcer for which he was operated on by Dr. F. The hardening of the paraproctic tissue, which Freund, for instance, in his description of the parametritis chronica atrophicans mentions also, may easily be conceived to be the cause of pain in consequence of pressure on the nerves and ganglia of this region. This hardening itself cannot be cured by any treatment, and may explain why the volvulus patient is not free from disagreeable sensations to this day. Though it is possible to restore normal evacuations of the bowel by operation, it is not possible to cure by operative or other means the chronic induration of the connective tissue. I have observed this same difficulty in a case of recurrent volvulus which I operated on in 1900. The patient at first continued to complain of disagreeable sensation in his abdomen, but he is well and hearty now and attends daily to his hard work. It may be assumed that with the regulation of the action of the bowels, produced by the operation for the volvulus, the previously existing ulcerations in the bowel may heal, and, no further infectious material being carried into the

mesentery, the inflammatory condition of the mesentery may quiet down and the patient recover, with the old scar tissue in the mesentery not troubling him any further or even softening up. In the same way we see indurated cicatricial tissue around ulcers in other parts of the body heal and grow soft after the ulcer is healed, as, for instance, in cases of varicose ulcers of the leg.

These considerations and the clinical observations mentioned prove that mesosigmoiditis in itself is a pathological entity deserving our attention. Whether it leads to volvulus or not is perhaps a minor question. It may do so or it may not. Its treatment, at any rate, is inseparable from that of the volvulus, and a brief discussion of the methods to be used in the absence of acute volvulus may be permitted here.

The treatment which was carried out in our case was that first advised by Roser and Roux. It is important to remember that Roux himself had to operate three times on one case, because the volvulus returned after the first two operations. Roux attributes this recurrence to insufficient extent of the suture, and advises to attach the mesosigmoid in its entire length. It is necessary to place the suture so that no artificial deep recess behind the sigmoid is formed, which might give rise to an internal strangulation. Therefore the lower part of the sigmoid has to be attached to the lateral rather than the anterior wall in order to prevent this formation of a pocket. It is easier and safer to attach the mesosigmoid to the anterior abdominal wall rather than to the posterior wall on account of the important structures of the posterior wall, which might be injured or interfered with by the sutures (ureter, iliac arteries, and veins).

Riedel's method of dissecting out the cicatricial bands has been carried out by him only. It would seem that any dissection of these cicatricial masses would only lead to the formation of new scars and favor more adhesions.

The resection of the sigmoid in cases of mesosigmoiditis, as first advised by Obalinsky and as carried out during the interval by von Eiselsberg and Steinthal, is the most radical

method, which ought to be reserved for the most pronounced cases of shrinking of the mesosigmoid, or cases where the shrinking and the recurrent volvulus are complicated by irreparable changes in the substance of the bowel, such as, for instance, would be represented by Graser's diverticula, or where the shrinking of the mesosigmoid has advanced to the formation of a "double-barrelled" sigmoid, if such a condition should ever be observed outside the acute volvulus. A Roux operation, even with the addition of Riedel's procedure on the bands, would evidently be impossible, and certainly insufficient in this condition of the "double-barrelled" sigmoid.

Anastomosis of the two ends of the sigmoid close to its points of attachment as advised by Braun would seem to favor recurrence of the volvulus, as it would tend to render the line of attachment of the sigmoid extremely small.

Entero-anastomosis between cæcum and descending loop of the sigmoid, the method of necessity sometimes in acute volvulus, is objectionable in the absence of acute volvulus, because the anastomosed parts of the bowel course free across the abdominal cavity after this operation, and thereby favor formation of knots and strangulation of loops of intestine, unless the operation be combined with a Roux attachment.

LITERATURE.

von Eiselsberg. Deutsche med. Wochenschrift, 1899.

Freund. Gynäkologische Klinik, 1885.

Gersuny. Verh. d. Deutsch. Ges. f. Chirurgie, 1899.

Graser. Ibidem. and Muenchner med. Wochenschrift, 1899, No. 22.

Koch. Deutsche Zeitschr. f. Chirurgie, Vol. xlii, 1.

Kulın. Beitr. zur klin. Chirurgie, Vol. xxxvi, 1902.

Obalinsky. Arch. f. klin. Chirurgie, Vol. xlviii, 1894.

Philipowicz. Ibid., Vol. lxx, 1903.

Riedel. Ibid., Vol. xlvii, and Verh. d. Chirurgencongresses, 1898.

Ries. Journal of Experimental Medicine, 1897. Annals of Surgery, 1902.

Roser. Centralbl. f. Chirurgie, 1883.

Roux. Ibid., 1894.

Steinthal. Verh. d. Deutschen Ges. f. Chirurgie, 1900.

For additional references, see Kuhn's paper and Brehm, Arch. f. klin. Chir., Vol. lxx, 1903. The latter also contains good drawings.

MECKEL'S DIVERTICULUM.1

WITH REPORT OF STRANGULATED INGUINAL HERNIA OF SAME.

BY FRANK E. BUNTS, M.D.,

OF CLEVELAND, OHIO,

Professor of Surgery in the Western Reserve University; Surgeon to St. Vincent's Hospital.

Meckel's diverticulum, or the diverticulum ilei, is sufficiently common to merit a greater familiarity with it than commonly exists, and its importance arises chiefly from its relation to certain forms of intestinal strangulation, to the persistence from birth of a fæcal fistula at the umbilicus, and, more rarely still, to its presence in a hernia. It is my desire to place on record a case of strangulated inguinal hernia in which the sole contents was a Meckel's diverticulum. It may be of interest in this connection to give a general outline of this diverticulum, its origin, development, and subsequent changes.

Lavater is said to have been the first to record its having been observed, and Ruysh, in his "Thesaurus Anatomicus," published in 1701, also called attention to this abnormal development, giving it the name of diverticulum and presenting an illustration of the same. Morgagni, in his treatise on the "Seats and Causes of Disease," reports several cases of diverticulum of the ileum, and also mentions that he had a case of inguinal hernia in which it was found, and states, also, that he had seen the same diverticulum in geese, particularly one of such breadth that it could not be taken for the remains of that duct which has formerly belonged to the vitellum, thus recognizing its embryologic import and derivation.

We must, however, render to Johan Friederich Meckel the distinction of first calling a more general attention to the

¹ Read before the Ohio State Medical Association, May 19, 1904. 536

diverticulum ilei, which in his essay he most clearly differentiated from the acquired pseudodiverticuli occasionally found along the course of the intestinal canal. It was Meckel who advanced the theory that it represented the remains of the omphalomesenteric duct, which theory has received common recognition. He also called attention to its importance in the causation of certain intra-abdominal affections.

It is interesting to note that the American ornithologist, Elliot Coues, to whom the research of Meckel seems not to have been known, reports two cases of these rare formations under the name of umbilical cæca. His deductions are most interesting, as he not only arrives at the same conclusions drawn by Meckel fifty years previous, but from his knowledge of ornithology the more fully substantiates this theory. Coues states that in the Class Aves a true umbilical cæcum is frequently to be met with, forming a diverticulum or pouch, to which those described by him are at least in their material features quite similar. This diverticulum he states is situated at the original point of entrance of the vitelline duct into the intestine, and is the remains of, or rather an indication of, the previous existence of the duct. He further adduces the confirmatory fact that a remnant of an embryonic organ is quite persistent and very generally to be found throughout the lower orders of birds, as the Grallatores and Natatores, while in the higher orders, as in the Raptores and Passeres, it is only of exceptional occurrence and difficult of recognition.

Ahlfield, among others, denies that the diverticulum derives its origin from the vitello-intestinal duct, and claims that it is developed as the result of traction upon the intestines by the ductus-omphalo-mesentericus. This duct normally remains in connection with the intestine until the latter recedes into the abdominal cavity, or at about the third month. At this time discontinuity between the duct and intestine should occur. Should this disconnection not occur, manifold congenital variations of the gut may result. Among these variations is mentioned Meckel's diverticulum, it being the direct result of traction exerted upon the intestinal wall, which, gradually

giving way at the point of greatest traction, gives rise to the formation of such an appendage.

The relative frequency of the occurrence of this diverticulum was noted by Rolleston, of St. George's Hospital, to be ten in 337 cases examined, a percentage of 3.37 per cent. Osler observed it in 2 per cent. of cases. In the Collective Investigation of the Anatomical Society of Great Britain and Ireland, it was found sixteen times among 769 subjects, a trifle over 2 per cent. This is in accordance with the statements of Quain and Treves. Mitchell found it present in thirty-nine cases out of 1635 examined, or slightly over 2 per cent.; but remarks that its order of occurrence is quite inconstant; thus in 200 successive autopsies not one case was found, and then again its presence was noted in two successive cases. Kelynack found but eighteen examples among 1446 subjects examined, a proportion of a little over I per cent., while Albers says that it occurs about one time in 1000 subjects examined, making it 1/10 per cent. This certainly seems too low an average. Out of Mitchell's thirty-nine cases, it was found four times in women and thirty-five in men. Kelynack in eighteen cases reports eleven as occurring in males to seven in females; there being thus a decided preponderance in frequency in the male. While the frequency of its occurrence has varied considerably according to the various observers, yet it will be found that its location is subject to still greater variance. Meckel's diverticulum is usually stated to be in the lower fourth of the ileum, at a variable distance of from one to four feet from the ileocolic valve, this being the position assigned to it by Meckel himself. Gegenbauer gives it at from one-half to two metres; Henle as one and one-half to three feet; Quain as an average of forty-eight inches, with a variation of from eleven to 120 inches. Tillman states it to be one-third to one and one-third metres from this point; Hemmeter says one to six feet, averaging two and one-half to three feet; Treves from fifteen to thirty-six inches; Kelynack gives an average of thirty-nine and one-half inches in eighteen cases examined with the extremes of fifteen to fifty

and one-half inches; Lamb, in a tabulation of 185 cases, reports it being situated in 21 per cent. between the ileocolic valve and one foot above this valve; in 19 per cent., two feet above the point; and in 12 per cent., two to three feet distant.

It does not seem, however, that the diverticulum is restricted to any particular portion of the intestinal tract, for it has been described as located anywhere from the pylorus to the ileocolic valve, and to have been found in the cæcal region as well as upon the æsophagus. The term diverticulum ilei is, therefore, misapplied, as it occurs in the jejunum in a considerable number of cases. Lamb found the record of fourteen cases in which it had occurred in the jejunum and of seven where it had been found in the duodenum. Buzzi reports a case where a diverticulum thirty-three millimetres in length was found on the jejunum opposite its mesenteric border and one metre distant from the duodenojejunal angle. its anatomical character and the microscopical research, he concluded that it was to be regarded as a misplaced Meckel's diverticulum. Treves, however, cites this case as being a congenital diverticulum of the jejunum quite distinct in origin from Meckel's diverticulum. Similar cases are also reported by Clarkson and Collard, in one of which it was said to have its origin two feet from the pylorus. Dr. Elliot Coues reports two instances of this abnormal point of origin. Meckel refers to four cases reported by Walther and one by Grieding, in all of which the jejunum was the site of this vestigial structure, and considered them to be identical with those having their connection with the ileum.

Lamb states that it has been found seven times in connection with the duodenum, and refers to two cases in the Army Medical Museum. In one of these, a female mulatto seventy-one years old, it was found to arise from the middle of the duodenum, being about two inches long, and having its outer wall so thinned that the presence of the muscular wall seemed to be problematic. Albers also reports a case of this kind in which the diverticulum arose from the transverse portion of the duodenum. Mayers reported a case arising

from the duodenum, and containing a number of valvulæ conniventes for a short distance from its point of origin. Nor, as has been before suggested, has the remaining portion of the alimentary tract been exempt from its occurrence. Fitz, in a paper on "Persistent Omphalomesenteric Remains," refers to the well-authenticated case of duplication of the esophagus. small intestine, cæcum and colon, and explains such anomalies on the assumption of an abnormally high or low seat of the omphalomesenteric duct. A duplication of this kind being of diverticular origin has originally a blind extremity; through the accumulation of meconium or pressure, perforation may result, and thus explain the communication with the intestine proper which usually exists at both ends. Fitz concludes his statement by saying that the view that most, if not all, wellauthenticated instances of duplication of its course are the probable result of persistence, and growth of the remains of the vitelline duct is rendered highly probable from what is known concerning the development of the intestine.

The abdominal cavities are not differentiated at that period in fætal life when the vitelline duct is present. The seat of the latter, high up or low down in the fætus, would satisfactorily account for the various places of origin of the duplication in question, as it does for those of the diverticulum. It has already been made apparent that the latter may arise at any point between the pylorus and the cæcum. Whether the duplication or the diverticulum is to result, depends presumably on the existence of conditions favoring or checking the growth of the intestinal walls. The duplication is thus to be regarded merely as an elongated diverticulum, and, like the latter, as will be shown later, may lie within as well as outside the mesentery.

This variability of position can alone be explained along developmental lines. In its earlier state the intestinal tube or gut tract is differentiated into three portions: a head-gut which lies cephalad to the intestinal attachment of the vitelline duct, a hind-gut which lies near the tail end of the embryo, and the mid-gut or intervening third portion. Later, i.e.,

during the fifth and sixth weeks, when the pharynx, œsophagus, stomach, and part of the duodenum have become differentiated in the foregut, the mid-gut becomes U-shaped, and is then known as the umbilical flexure or navel loop. From this portion of the intestine are now developed the lower part of the duodenum, cæcum, and colon. At the point of greatest convexity of this flexure the vitello-intestinal duct is attached, and towards it, also, proceed the omphalomesenteric arteries. From the upper limb of the umbilical flexure is subsequently developed the jejunum and part of the ileum; from the lower limb, the remainder of the ileum, cæcum, and ascending colon. Since the point of attachment of the vitelline duct, as Heisler says, is not far from the termination of the small intestine. Meckel's diverticulum, when present, is connected with the lower part of the ileum at a point from one to three feet from its termination. In the subsequent development of the small intestine, however, different portions may be hindered in its growth, as Leichtenberg states, the greater part of the small intestine is formed from the posterior or lower leg. The diverticulum in such a case would then be placed abnormally, i.e., in the jejunum or even duodenum. A retardation of growth in the lower limb would, on the other hand, explain those cases in which Meckel's diverticulum is found a short distance from the ileocolic valve. This is the view which has also been advanced by Fitz, who, relative to the variation in the position of Meckel's diverticulum, says, "Since the diverticulum is present, if at all, in the carliest weeks of fœtal life, it is obvious that its position with reference to the ileocæcal valve must change with the growth of the intestine. The preponderant elongation of the intestinal tube above the insertion of the duct is accompanied by a less longitudinal growth below this point, and the diverticulum is usually found in the vicinity of the valve." The occurrence of the diverticulum prolongation on the ileum, jejunum, and lower duodenum is most rationally explained by this theory. In the upper portion of the duodenum in its first and second parts diverticuli may, however, be of different origin. It is known

that the hepatic diverticulum, from which the liver is developed, may give rise through developmental defects and aberrations to certain of these congenital duodenal diverticuli. Such diverticuli also occur as isolated pouches, which, when present, are constant in position, *i.e.*, above the biliary papilla, according to Treves. Other objections to the assumption that the duodenal diverticuli are in their origin vitello-intestinal are also apparent in the cases reported.

In the case of Lamb, the absence of muscular fibres rather denotes an acquired character, and it can, therefore, not be considered a congenital structure. It belongs to the cases of false or pseudodiverticuli, to which attention had been called by Rokitansky.

As to the remaining parts of the alimentary canal (œsophagus and cæcum) in which the occurrence of duplication has been referred to, the abnormal position of the diverticulum and its subsequent growth, as already alluded to in the view of Fitz, are dependent on the primary connection of the vitello-intestinal duct and intestine, and does not result from a disproportion in growth of the digestive tract. The exact position of the diverticulum on the intestinal loop is in the great majority of cases along the free border of the gut or opposite to its mesenteric attachment. Yet this, too, is subject to variation. Kelynack observed that its origin was not always immediately opposite the mesenteric attachment. Kern in a case of patulous umbilicus, which he operated on, found that the Diverticulum Meckelli arose from a position which was not directly opposite the mesenteric attachment of the intestine, but which lay towards the lateral aspect of the gut; and Dennis, in his "System of Surgery," figures several specimens in which the diverticulum springs from the mesenteric border, and lies intramesenteric. In two cases reported by Mitchell (Cases 5 and 13) it arose from the side of the gut, in one of these close to the mesentery. Fitz, in speaking of this lateral variation, remarks that the instances are not few in which the side of the intestine, even the immediate vicinity of the mesenteric attachment, is the starting-point. He then

refers to a case in the Warren Museum, Specimen 732, an intramesenteric duplication of the intestine, which was found in a child from eight to ten months old. Two intestinal tubes more or less parallel are to be seen in this specimen, one being in the usual position of the intestine, the other to its inner side, between the two layers of the mesentery.

The diameter of the inner tube is somewhat smaller than that of the outer, except in the immediate vicinity of the opening, at which the two tubes communicate where a dilatation The contiguous portions of these two structures are in close proximity to each other throughout the greater part of their course and are fused near the common opening. opening is rounded, sharply defined, one-third of an inch in diameter, and appears to be covered with mucous membrane. The walls of these tubes are composed of mucous, muscular, and peritoneal coats; the mucosa of the outer tube showing slightly projecting transverse folds in the vicinity of the opening, while that of the inner tube is relatively smooth. Villi and crypts are said to be present in both these structures. concludes that in these cases the most satisfactory explanation of the origin of this anomaly is based upon its representing an intramesenteric diverticulum, although its bifurcated shape and seat of constriction and dilatation deserve special consideration. As both these characteristics may, however, be possessed by other diverticuli, this objection is not valid. Dennis reports a similar case of intestinal duplication where the accessory gut lay intramesenteric, and for the explanation of which the omphalomesenteric theory is advanced. The cases of intramesenteric cysts of Roth are also to be classed under this category of lateral variation of Meckel's diverticulum, as stated by that writer himself. Treves, however, remarks of these cases that it is a question whether the elongated diverticuli, which are described as growing between the layers of the mesentery, are real instances of Meckel's diverticulum, but gives no evidence as proof of this assertion.

The length of Meckel's diverticulum is in part dependent on the degree of involution the omphalomesenteric duct undergoes. Normally, the involution of this embryologic structure is complete, and no trace of its former existence is to be found in man. When present, however, its length forms one of its most inconstant characteristics. It is found as a small, blunt, peglike projection, and varying up to a diverticulum ten inches in length. Its average length as given by Quain is one to three inches; by Rokitansky, five to six inches; by Henle, one-half to six inches; by Albers, one to seven inches; by Kelynack, one-half to six inches, or an average of two and one-quarter inches. Cazin gives it as one to seven inches, or eight inches; and Treves as two to three inches. Lamb, in a tabulation of 185 cases, found its length definitely given in 109 cases. forty-four cases it was reported as being from one to two inches long; in twenty-nine, from two to three inches; in fifteen, from three to four inches; in five, from four to five inches; in two, six inches; and in one, seven inches. Lamb concludes that of the entire 109 cases, the number of those in which the diverticulum was between one to two inches long exactly equalled those in which it was between two to four inches, giving an average, therefore, of two inches in length.

The usual form encountered is the tubular variety resembling the finger of a glove. In such a cylindrical prolongation the diameter nearly equals that of the gut proper. In many instances the diverticulum when of this form tapers more or less gradually towards its blind extremity. According to Treves, the diameter of its base is usually less than that of the gut from which it arises, although sometimes the diameter of the two tubes may be nearly identical. It may also retain the same width throughout, and thus resemble a glove-finger; but its base is usually considerably wider than its free extremity. Tillman states that the diverticulum has sometimes a greater diameter than the small intestine itself. When attached to and patulent at the navel, the diameter throughout its course may remain unaltered, or be but slightly diminished at its umbilical attachment. Among the divergencies from this usual form are to be mentioned the presence of constrictions which may occur throughout its course, most usually,

however, towards one of its two extremities. At the junction of the small intestine such a constriction, when marked, gives rise to the globular or inversely conical variety, in which the diverticulum was connected with the ileum by a narrow mouth three-quarters of an inch wide, then extended to a diameter of one inch and rapidly widened into a large pouch almost as big as the cæcum. This dilated portion had a diameter of three and one-quarter inches, a circumference of ten and onehalf inches, and lay quite free in the abdomen. Kelynack suggests that its large size is probably of an acquired nature, and that it may be referred to as a distention from the intestinal contents. When the constriction becomes complete in the globular variety, the communication with the small intestine may entirely, or almost altogether, cease, and the diverticulum, as Roth has shown in the report of several cases, give rise to an intra-abdominal cyst.

The extremity of the diverticulum varies considerably in shape. Thus it may be clubbed-shaped or, in rare cases, it may be bifid. Both Kelynack and Fitz refer to such cases. Treves speaks of a specimen in the London Hospital Museum in which the ampulla at the end of the diverticulum had a hammer-shaped outline. Hyrtl remarks that branch-like diverticuli are very rare, but reports an instance in which a diverticulum one inch in length and divided into five parts was found in a hemicephalic monster. More important than any of these cases are those in which the extremity is patulous and communicates with the exterior at the umbilicus. A patulous Meckel's diverticulum at the umbilicus gives rise to a fistula or what has been termed anus præternaturalis umbilicalis. This patulency is generally ascribed to the free end of the diverticulum extending through the umbilical ring into the umbilical cord, so that when the cord is severed the extremity of the intestinal appendages is likewise exsected. With the subsequent exfoliation of the navel the umbilical fistula is established. This view is advanced by Merian von Seibold and Shepard. Bart, on the other hand, claims that this does not occur, and the existence of a congenital umbilical hernia is

not essential for the patulency of the umbilicus to result. According to this writer, the extremity of the diverticulum merely extends to the umbilical ring, and does not pass beyond the same. A necrosis which may follow the separation of the cord can, however, establish an intestinal umbilical fistula.

In its structure, Meckel's diverticulum resembles the small intestine, being composed of three coats. In the muscular coat both the longitudinal and circular fibres are directly continuous with those of the small intestine. The mucosa is like that of the intestine, containing Lieberkuhn's crypts, solitary follicles, and Pever's patches. Of the latter but one is commonly found, and when present is subject to the same pathologic changes as take place in the ileum. Vaughn reports a case in which at the autopsy of a patient, who died of enteric fever, a diverticulum was found seven and one-half inches in length, and containing two small swollen Peyer's patches near its origin and several enlarged ulcerating, solitary glands. At the junction of the diverticulum and ileum the mucosa in reduplicating may give rise to a valve. Meckel observed its presence in three cases out of over twenty examined. He interpreted its presence to be an attempt at closure. According to Buzzi, Klebs also mentioned its occurrence, as did Cazin and Albers, who referred to a valve-like formation similar to those found at the ileocæcal and appendiculocæcal junctions. Roth reports a case in which this valve almost completely closed the intestinal opening, and thus accounted for the small amount of intestinal contents which escaped through its fistulous opening at the umbilicus, the tube being large and patulous in its other parts. Structurally, this valve consists of a reduplication of the mucous membrane, between the two layers of which a certain amount of connective tissue is found; towards its attached end a few muscular fibres are also present. Roth says that a similar though much less distinct valve may occur at the umbilical end of a patulous diverticulum, ordinarily from the obliteration of the emphalomesenteric vessels, but may, according to Treves, be referred in some cases to the obliteration of a part of the diverticular extremity.

The occurrence of Meckel's diverticulum in a hernial sac has been frequently referred to by various writers and observers. Morgagni and Littre each report a case of this kind in a scrotal hernia. Meckel himself, and since his report many writers have mentioned and alluded to the possibility of its occurrence. Cazin, in the dissection of the scrotal hernia, describes a diverticulum found in the sac. Duplay and Reclus, also Ludwig and Tilling, have published in their surgical works and papers instances of umbilical hernia containing Meckel's diverticulum.

The hernias in which the diverticulum has so far been exclusively found are those of the umbilical and inguinal variety, and especially in the congenital type of the umbilical, or in the funicular hernia; there is a predisposing factor for the retention of Meckel's diverticulum in the hernial sac. According to Ahlfeld, the congenital umbilical hernia is caused by an abnormal thickness of the vitello-intestinal duct, which prevents the recession of the intestine into the abdomen, thereby giving rise to the formation of a hernia. The portion of the intestine attached to this duct is in all cases the last to enter the abdominal cavity, and therefore, when Meckel's diverticulum is present, and such a hernia exists, it is to be found among the contents of the intestinal protrusion.

To this class of congenital umbilical hernia belong the many instances of Meckel's diverticulum patulous at the navel, for in these cases the diverticulum is invaginated into the umbilical ring, and during the deligation of the cord its extremity is severed from the rest of the process. The intestinal coils which are found within the rupture of the inguinal region or an acquired umbilical hernia are, as is known, those possessing the longest mesentery. Elongation of the mesentery results from an actual increase in its length or from a ptosis of this structure. This was first pointed out by Richter to be an important factor in the causation of hernia. Anatomically, the longest mesentery is possessed by the lower ileum or by the same intestinal coils which are generally the site of Meckel's diverticulum when present. The fact that the lower ileum

possesses the longest mesentery can be referred to embryological development, that is, to the umbilical flexure in which the omphalomesenteric duct is found at the height of the convexity in the intestinal loop, which portion is already at this time attached to the longest mesentery. At this point, moreover, the mesentery may still be further elongated by retention of the intestine within the cord beyond the normal period, so that when recession does occur the mesentery is of abnormal length. In the further development of the gastro-intestinal tract this increased length may be retained, and there is then established one of the primary predisposing factors for the causation of a hernia, which, when occurring, has among its contents Meckel's diverticulum, if this should exist.

Usually, the diverticulum is found within the hernial sac in conjunction with the intestinal coils to which it is attached. More rarely the diverticulum is found alone within the hernia. There is then what may be termed a true hernia of Meckel's diverticulum.

Such a case is reported by Dowse in a female, aged seventy-seven years, in which an artificial anus had formed in the right groin. At a postmortem three months after the formation of the fistula, a direct inguinal hernia was found whose sac contained a diverticulum which arose from the lower part of the ileum. Its distal extremity was adherent to the anterior side of the sac to the extent of half an inch. The diverticulum itself was funnel-shaped; its widest end, about two-thirds of an inch in diameter, being at the ileum, and was connected with the bowel almost exactly opposite to the mesenteric attachment. It measured one and one-half inches in length, was pervious throughout, and its coats were similar to those composing the walls of the ileum. Its mucous membrane was well marked and corrugated, having several oblique folds or valvuli conniventes of a small size. The orifice of the sac lay to the inner side of the obliterated hypogastric artery, so that a direct inguinal hernia existed. The fæcal fistula which had resulted had probably been produced by the fæcal accumulation and distention of the diverticulum, which was followed by ulceration and perforation. Although in this case no mention is made of Meckel's diverticulum, it seems most probable, from the description given, that this was the structure involved. Of congenital umbilical hernia which contains Meckel's diverticulum, the following cases have been reported:

Schroder gives the case of Muller, who, in a dead-born fœtus eight months old, found an umbilical hernia which contained a blind Meckel's

diverticulum one inch long, and which was adherent to the neck of the sac.

Ahlfeld reports the case of a girl who died immediately after birth, which was slightly premature. She had an umbilical hernia which contained a diverticulum one to two inches long, whose extremity was adherent to the umbilical ring. A persistent omphalomesenteric artery running along the side of this diverticulum was also found. This artery lost itself in the mesentery of the small intestine near their junction.

Braus, in a child seven years old, found a protrusion at the umbilicus which measured eight centimetres, had a pedicle, and was but incompletely reducible. Upon opening the tumor, a Meckel's diverticulum was found, which was excised. Gluck, in a child born at seven months with an umbilical hernia and which had signs of peritonitis and strangulation, found that these symptoms had been caused by an accessory mesenteric fold bound to a diverticulum of Meckel's and passing over the intestine. A radical operation for umbilical hernia was performed, and both the diverticulum and mesenteric fold were resected.

Dunchamp reports a case of umbilical hernia in which operation was decided on, as the hernial sac was found thin and transparent, but quite reducible. Just as the operation was about to begin, the sac suddenly burst and the intestine flowed out en masse. Among the intestinal coils, the cæcum, appendix, sigmoid flexure, and a Meckel's diverticulum, two centimetres long and adherent to the herial sac by its extremities, were found.

Rosenblaum describes a case in which a persistent omphalomesenteric duct was found during the course of an operation for the radical cure of umbilical hernia.

Hallet gives the instance of a girl two hours old who had an irreducible hernia at the umbilicus the size of a fist. At the operation, the contents of its sac consisted of the cæcum with its appendix, and the small intestine with an adherent Mcckel's diverticulum. A radical operation was performed, and the appendix and the diverticulum were removed.

Tiedeman, as quoted by Roth, found in a full-term male with a double cleft palate and harelip, and an accessory finger on both hands, an umbilical hernia the size of a walnut. Its contents were an intestinal loop, pyriform cyst fourteen and one-half lines in length, seven lines in width, and which had a pedicle or canal three and one-half lines long attached to the convex margin of the gut. The cyst contained a yellowish fluid and communicated through the canal with the lumen of the gut. Tiedeman thought this cyst to be the true umbilical vesicle. By Roth it is regarded as an enterocyst within a hernial sac.

Carle reports a case where, in an umbilical tumor, a hernia of Meckel's diverticulum was diagnosed. The operation confirmed the diagnosis. When the sac was opened, a small tumor, the size and form of a strawberry partly reducible, appeared. Its summit was pierced by an orifice, which led into a canal nine centimetres long, and from which a clear fluid with a fæcal odor oozed out in abundance. At birth the child, according

to the mother, was attached to a short cord about the thickness of a man's thumb.

In inguinal hernia, the diverticulum, though more rarely found, has been noted in the following instances:

According to Morgagni, Benevoli has described a hernia which was constituted of an appendix to the ileum and extended into the scrotum, although it communicated with the intestine by an orifice, which, in the dead body, was not larger than a middling sized filbert, yet during fifteen days the patient vomited everything he took into his stomach, and at an early period of the disease threw up matter which resembled excrement. The ileum, to the extent of half an ell, at the part corresponding with the hernia, was not of its natural color, and was exceedingly corrugated and contracted.

Morgagni then describes a case which came under his observation: an inguinal hernia containing an incarcerated diverticulum. A porter, fifty years of age and broken down with constant labor, had a hernial tumor in the right groin the size of a man's thumb. Sometimes it apparently vanished, but about the middle of March, 1706, without any obvious cause, he was seized with pain in the abdomen. The pain though wandering was so severe that he compared it with canine gnawing. On the sixth day he was brought into the Hospital of St. Mary de Morte. His skin was nearly cold; his pulse exceedingly frequent and small; nor did it offer but slight resistance to the fingers, but it struck them with unequal force. The whole abdomen was distended like a drum, especially below the right hypochondrium, where the coils of the colon could be distinguished by the hand. The hernia was exceedingly tense, but was not the principal seat of his pain. He vomited his food and voided no fæces, nor could he even expel flatus. He died on the evening of the ninth day.

Dissection. The omentum was found extending into the hernia, and, with the exception of some broad transverse lines, it was generally reddened by inflammation. The spleen exhibited a morbid lividness, which penetrated a considerable depth into its substance. The stomach and the tract of small intestines, as far as the hernia, were greatly distended with a yellowish matter resembling fluid excrement. The large intestines were contracted and white, and it was evident that nothing had passed through the part of the ileum connected with the hernia, although merely a process of the intestine crossing the orifice entered the sac. This process was constituted of a projecting portion of the parietes, and was in the form of a semi-oval cavity, the larger axis of which, where it commenced gradually from the intestine, was about three digits in the longitudinal direction of the intestine; but the smaller axis was much less. From this commencement it progressively contracted and extended to the length of an inch. This portion, therefore, whether denominated a cavity or a diverticulum, was the only part of the intestine contained in the sac with the extremity of the omentum. Neither of these parts,

ν.

however, could be withdrawn, not only from constriction in the orifice, but also in consequence of a fibrous adhesion to the sac. The sac itself was formed by the peritoneum, which protruded at the other side of the spermatic vessels, and on each side there existed an enlarged inguinal gland. That portion of the intestine which was contiguous to the sac, but more especially the diverticulum, was of a red color, inclining to lividness; and from this part to the stomach the coats of the canal were reddened by their turgid and crowded vessels, and the mesentery presented a similar appearance.

According to Thompson, Littre describes a case in which a Meckel's diverticulum four inches in length was found in a scrotal hernia of a man forty-eight years of age. Thompson reports the case of a colored man fifty years of age, with a left inguinal hernia, which had been at no time reducible and had been present for about ten years. On the day previous to that on which he was seen, it had occasioned him some trouble, and he had reduced it himself after attempting to do so for three hours, the rupture then entirely disappearing. During the night serious symptoms appeared, and in the morning the abdomen was somewhat tender and swollen on the left side. Vomiting at intervals of about half an hour: pulse, 120; temperature, 101° F. On opening the hernial sac, free feetid gas, intestinal contents, and semipurulent fluid were discharged. sac was entirely emptied and the internal ring free. Upon prolonging the incision upward towards the anterior superior spine, fæcal matter and pus were also evacuated from the abdominal cavity in great quantities. An unsuccessful search was then made for a perforation among the intestinal coils, which were matted together. Death shortly after. At the autopsy, which had been allowed only through the operation wound, a perforation was found at the base of a Meckel's diverticulum, which sprang from the ileum thirty-nine inches from the ileocæcal valve. The rent was two centimetres long, opening completely into the alimentary canal. At the apex and along one side were evidences of old peritonitic adhesions, which had probably bound it down firmly to the wall of the hernial sac.

Dugan gives the case of Vance, which was that of a delicate male child who had a reducible inguinal hernia, which became irreducible and strangulated. The usual operation for this condition was performed, strangulation having existed for six hours. The contents of the sac proved to be two coils of intestines ilcum projecting through the ring with a Meckel's diverticulum wedged in between them, thus making reduction or taxis impossible. The diverticulum measured at least seven centimetres in length. Its lumen was as large as that of the gut. The usual steps for a radical cure were gone through with, the result being satisfactory. Banks, before the Liverpool Medical Institution, February 8, 1896, showed a Meckel's diverticulum which he had removed from the sac of a hernia, the small bowel being also present. It is not stated whether this was an umbilical or inguinal hernia.

Webster reports the following case. In a woman aged forty-two, who had fallen a few days before, a distended abdomen and a large tender mass in the left inguinal region, occupying the inguinal canal, was found.

Partial reduction was possible; but a hard mass looking like intestine was discovered, and on carefully opening the intestinal ring and separating the adhesions this was found to be a Meckel's diverticulum proceeding from close to the mesenteric border of the ileum, having a well-defined mesentery of its own. The mesentery was tied off and the diverticulum removed close to the ileum, and the opening of the bowel, which was of sufficient caliber to admit the tip of a finger, closed by a double row of Lembert sutures. The diverticulum measured three and one-half inches in length. The intestinal lumen was continuous for about three inches, the diverticulum ending in a mass showing some old inflammatory thickening. There was a good deal of inflammatory thickening of the ileum surrounding the diverticulum, showing that that portion had been constricted in the inguinal ring. The operation was completed by suturing the rings for a radical cure of the hernia. The patient made an uninterrupted recovery.

To these cases I wish to add the report of a case of strangulated hernia in which the contents of the sac consisted only of a rather large Meckel's diverticulum and a portion of the wall of the small intestine to which it was attached.

The patient was a male laborer, aged twenty-three years, who was admitted to Cleveland City Hospital, January 28, 1902, suffering from evident pain in his right groin and frequent vomiting. Twenty hours previous to his admission to the hospital, while lifting a heavy box, he was seized with a severe pain in the right inguinal region accompanied by a sudden tumor formation. This had never appeared before according to the patient's statement, but, as he was not a very intelligent man, reliance could not be placed on his statement. Vomiting soon set in, and persisted at frequent intervals, until upon admission to the hospital it was distinctly fæcal in character. showed the patient to be suffering from shock, the abdomen was much distended, and the hernial tumor occupied the upper part of the scrotum and extended back along the inguinal canal. Under general anæsthesia, the hernial sac, which was very tense, was opened up and found to be filled with a dark, bloody fluid and what appeared to be a single knuckle of the intestine, resembling more a moderate sized gall-bladder. The peculiarity of its shape led to the pulling out of more intestine from the hernial orifice, and it was found to be a diverticulum six centimetres long by four centimetres in width. It was sharply constricted

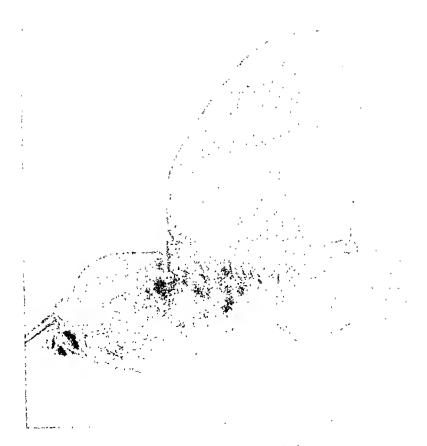
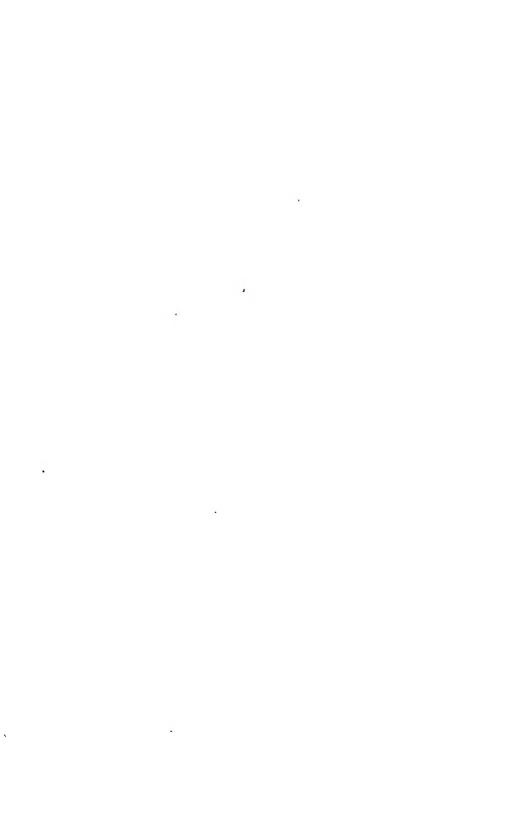


Fig. 1.-Meckel's diverticulum.



at its neck where a portion of the ileum had been pulled down into the sac and seized by the constricting ring. The diverticulum and adjacent portion of the ileum, as shown in the photograph (Fig. 1), were black and apparently at the point of gangrene. Exposure and hot applications did not affect the color; being afraid to return it, I decided to resect the intestine, removing about ten centimetres of the intestine on either side of the diverticulum and uniting the resected ends by a Murphy button. The gut was then returned to the abdominal cavity and the operation completed by the Bassini method. The wound healed without suppuration and no special symptoms developed. The patient left the hospital, March 31, 1902, able to resume work. The button had not yet passed.

BIBLIOGRAPHY.

Ahlfeld. Archiv. for Gynæcology, 1875, viii, 363; also Vol. xi. Albers.

Allen. The Journal of Anatomy and Physiology, 1882, xvii, 59.

Banks. Lancet.

Barth. Deutsche Ztschr. Chir., 1887, p. 193.

Braus. Samml. klin. Vor., 1893, No. 77.

Buzzi. Virch. Archiv.

Carle. Lyon Méd., 1900, 236.

Cazin. Arch. Gen., 6 Sec., 1863.

Clarkson and Collard.

Coues. Medical and Surgical Reporter, Philadelphia, 1866, xv, 142.

Dennis. System of Surgery.

Dowse. Transactions of Pathological Society, London, 1874, 5, xxvi, 107.

Duchamp. La Loire Méd., Nov. 15, 1887.

Dugan. Pædiatrics, 1896, Vol. ii, p. 73.

Fitz. American Journal of the Medical Sciences, lxxxviii, 30.

Gluck. Berl. klin. Wchschr., January 19, 1885.

Hallet. Rev. de Gynecol., June, 1900.

Heisler. Text-Book of Embryology, 1899.

Hemmeter. Diagnosis of the Intestines, 1901.

Lamb. American Journal of the Medical Sciences, Vol. cv, 1893.

Leichtenstern. Ziemsen's Encyclopædia of General Medicine, Vol. vii, 1876.

Lockwood. British Medical Journal, 1897, ii, 459.

Kammerer. Annals of Surgery, 1897.

Kern. Beitr. z. klin. Chir., Vol. xix, 1897.

Meckel. Handbuch d. Path. Anat., 1812.

Mitchell. Journal of Anatomy and Physiology, xxxii, 675.

Morian. Arch. f. klin. Chir., Band lviii, 507.

Neuman. Festschr. r. Virchow, Berlin, 1901.

Rokitansky. Pathological Anatomy, Vol. ii, 1850.

Rosenblaum. Altona, 1898, 8.

Roser. Arch. f. klin. Chir., 1876, xx, 475.

Roth. Virch. Arch., lxxxvi, 377.

Schroeder. Ueber die Divertikel-Bildung am Darm-Kanale.

Shepard. Archives of Pædiatrics, Vol. ix, 1892.

Thompson. Annals of Surgery, 1898.

Tiedeman. Diekopflosen Missgeburten.

Tillman. Text-Book of Surgery. Deutsche Ztschr. f. Chir., xviii, 162.

Treves. Intestinal Obstruction, 1901.

Vance. Pædiatrics, 1898, 1172

Vaughn. New York Medical Journal, 1896.

Webster. Annals of Surgery, April, 1902.

CONTRIBUTION TO THE SURGERY OF THE DEEP URETHRA.

- I. PRIMARY URETHRAL ANASTOMOSIS AFTER LACERATED WOUND OF THE PERINEAL URETHRA.
- II. URETHRAL FISTULA, SEQUEL TO PROSTATECTOMY.

BY G. FRANK LYDSTON, M.D.,

OF CHICAGO,

Professor of Genito-Urinary Diseases and Syphilology in the University of Illinois.

I. Severe Traumatism of the Perineal Urethra; Extensive Destruction of the Urethra; Primary Urethral Anastomosis.— A young man, thirty-two years of age, had been under my care for a posterior urethral infection associated with a linear stricture of large caliber at the bulbomembranous junction. He had had recurrent attacks of what was supposed to be cystitis for several years. There were several strictures of large caliber in the anterior urethra. Considerable relief followed internal urethrotomy. As the irritation and infection of the posterior urethra persisted and was associated with spasm of the deep urethral muscles, following all attempts at instrumentation, perineal section was proposed, but was not submitted to. The chief argument against the operation on the part of the patient was the fact that a good-sized sound could be passed into the bladder, albeit with some little difficulty.

July 23, 1903, the patient was riding in a buggy behind a spirited horse, which ran away. He sprang out of the buggy just as it was swerved to the side of the street, where the front wheel came in contact with a horse-block. As the patient expressed it, the wheel rose to meet him as he came down astride it. He struck fairly upon the perineum, producing an injury which, considering the fact that the wheel was provided with a rubber tire of good size, was very remarkable. The perineum was torn through just in front of the anus, producing a large lacerated external wound, from which there was a severe hæmorrhage, the patient showing the effects of the loss of blood very plainly. He was taken to St. John's Hospital, Springfield, Illi-

nois, and I was telegraphed for. I saw him about eight hours after the accident. I found him suffering from the combined effects of shock and hæmorrhage. The local conditions were as follows: The scrotum and perineum were ecchymotic, and distended by an enormous hæmatoma. A ragged, lacerated, transverse wound about an inch and a half in length and curvilinear in form was seen in the perineum just anterior to the anus. There had been no retention of urine, a circumstance which was most fortunate for the patient, micturition being performed through the perineal wound. Without delay, a free incision was made from the base of the scrotum back to the margin of the anus, traversing at right angles the wound produced by the traumatism. A large quantity of clots was turned out from the perineum and scrotum. A large cavity was found anterior to the rectum, the hæmorrhage having in great part evidently come from the hæmorrhoidal vessels. The urethra was found to be disorganized throughout the entire extent of the perineal portion. The entire perineum might be said to be represented by a large irregular cavity, on the lateral walls of which the tendinous insertions of the glutei muscles could be seen. There was nothing remaining of the urethra in the perineal portion save a narrow irregular strip of the mucous membrane of the floor of the canal. Prior to incising the perineum, a large sound was passed, which missed the bladder altogether, and entered the cavity in front of the rectum. A catheter was also passed without the slightest resistance. This curled up in the cavity just described in such a manner that one might have conceived the notion that it had entered the bladder. The severed ends of the urethra were found with considerable difficulty. The canal had been torn across transversely, immediately in front of a stricture of large caliber at the bulbomembranous junction. The bulb had been torn transversely across and stripped up from the urethra both anteriorly and posteriorly.

It appeared that the fibrous tissue of the stricture had really protected the membranous urethra from laceration. The narrow stricture band was dissected out, after which the ends of the severed urethra were brought together over a full-sized sound, after trimming them smoothly with the scissors, and sutured by a continuous suture of fine catgut.

The surfaces of the severed bulb were next brought together

over the urethra and sutured. The perineal wound was partly closed and packed with gauze for drainage. A soft catheter was passed into the bladder and retained.

The course of the case was uneventful and primary union of the severed urethra was almost complete. The catheter was withdrawn at the end of ten days, and, despite the fact that daily irrigations had been made, it was found to be heavily coated with urates. In withdrawal, a slight separation of the line of union in the urethra was produced and a small amount of leakage followed. This, however, closed, and at the end of six weeks healing was complete. The urethra now admits a No. 33 French, and the case is in all respects in a most satisfactory condition.

One of the most interesting points in connection with this case was the fact that the perineal portion of the urethra was disorganized and the bulb extensively lacerated, while the membranous portion remained intact, showing that the point of division in traumatic rupture of the urethra is not always at a point corresponding with the subpubic ligament, the location almost universally described by the text-books.

The result obtained in this case, and others of a similar nature occurring in my experience, shows the wisdom of primary anastomosis of the injured urethra as prophylactic of extensive subsequent stricture. The condition in which I found the urethra and the perineum in this case was such as would inevitably have resulted in an extensive, intractable, traumatic stricture. It would, of course, be impossible to say what the ultimate result will be, but I feel confident from experience in other cases of the kind, that the anastomosis of the urethra will not be followed by stricture later on.

II. Two Cases of Urethrorectal Fistula following Prostatectomy.—It is not my intention to attempt in this paper the presentation of the various accidents that are liable to occur during or following prostatectomy, but merely to present two cases of an accident which is liable to occur in the practice of any surgeon who does a large amount of radical work upon the prostate, now that the perineal operation is so extensively used.

Case I.—Man, sixty years of age, with a moderately enlarged, hard, fibrous prostate. The perineal operation was employed, a Y-shaped incision being used. Enucleation was found to be impossible, and the overgrowth was removed by *morcellement*. The operation presented no unusual features. Perineal drainage with gauze and rubber tube were instituted. On the fifth day the drainage was removed. The parts at this time seemed in a perfectly healthy condition. On the eighth day following the operation, while an enema was being administered, the fluid was observed to return through the perineal wound. This being reported to me, I found on examination an opening which would easily admit the tip of the index-finger between the rectum and the track of the wound about an inch above the external sphincter. The sphincter and the rectal wall were divided to the level of the fistulous opening, in the hope that granulation would close the rectal wall as after the ordinary operation for rectal fistula. The result was disappointing, and a permanent fistula remained between the membranous urethra and rectum. Some months after the prostatectomy I operated for the closure of the fistula, the patient having been considerably annoyed by fæcal discharges through the urethra, and the passage of the entire urine by way of the rectum. In this operation I made a plastic upon the membranous urethra and upon the opening in the rectum. This operation was a failure. A month later I again operated by perineal rectoplasty. This operation proved a success.

Case II.—Man, aged sixty-five years. Large fibrous prostate. The patient had suffered from numerous attacks of retention, over a period of several years. For some months he had been compelled to rely entirely upon the catheter. The introduction of this instrument, at first easy and effective, became very difficult, was attended by severe hæmorrhage, and merely served to aggravate the symptoms. Prostatectomy was therefore proposed and consented to. Like the preceding case, this one proved very difficult, the prostate being so very hard that there was more than a suspicion of carcinoma, a suspicion which subsequent microscopical examination did not warrant. The overgrowth was removed by morcellement, great care being taken. A few days' drainage was instituted as usual. A few days after the operation the patient complained of severe burning in the wound, especially on micturition. The tube was removed, and the wound was found

to have an unhealthy appearance. A few days later it presented a very peculiar aspect. A thin eschar had formed on the wound surface. This was dry and adherent, and had much the appearance that would result from the application of the actual cautery. This eschar involved the tissues to the depth of about one-eighth of an inch. It extended entirely around the perineal wound, and was high up in the wound cavity, as could be seen. A distinct line of demarcation was noted about the eschar. This had the appearance of a line of vesication such as might have been produced by cantharidal collodion. On the twentieth day after the operation the eschar began to separate, and at the end of a week or ten days the wound was clean and granulating healthily. On the twenty-first day the fæces began to appear in the wound, coming apparently from a point very high up near the neck of the A few days later the urine began discharging by the On examination, a small area of sloughing was found rectum. to have developed in the rectum just below the vesical orifice. For a time a portion of the urine came through the urethra. After the perineal wound was thoroughly healed, there was no escape of fæces or gas through the urethra, but the entire quantity of urine was voided at regular intervals by way of the rectum. This has given rise to no special inconvenience, and the old gentleman is at work on his farm and very little annoyed by his condition, save by the knowledge that it is abnormal. An attempt to repair the fistula in this case would not only be unjustifiable, but would certainly fail of success.

The modus operandi of the formation of fistulæ in the foregoing cases is not difficult to comprehend in the second case. The age and malnutrition of the patient and the destruction of the rectal wall by sloughing incidental to what was probably a streptococcus infection from the bladder are sufficient to account for the action. Incidentally, I would call attention to the striking similarity of this case to the old-time hospital gangrene. It is barely possible that in the first case the rectum was injured during the operation. If so, the injury resulted from pressure by retractor in the hands of my assistant. There was certainly no cutting or laceration of the rectum at my hands. Admitting that such cutting or lacera-

tion had occurred, the location of the fistula was so low down that it would at once have been noticed. It is possible that in packing the wound or giving enemata by the internes and nurses after the operation the rectum was perforated. I do not feel justified, however, in laying the blame to this quarter. In both cases the capsule of the prostate was so adherent to the overgrowth that considerable disturbance of the prostatorectal space was necessary during the operation. In patients of a low grade of vitality, a slight bruising of the rectal wall with the operator's finger might result in the accident encountered in the two cases cited.

THE UNION OF UNUNITED FRACTURES OF THE NECK OF THE FEMUR BY OPEN OPERATION.1

BY LEONARD FREEMAN, M.D.,

OF DENVER, COLORADO.

In spite of the disability often accompanying ununited fractures of the femoral neck, the union of the fragments by open operation has attracted but little attention, although it is feasible and seems to give fairly good results. There are various reasons for this neglect, the principal one being that the condition is usually encountered in old people with poor resisting powers, so that an operation of such magnitude would be accompanied by more danger than would be compensated for by the advantages gained. This does not apply, however, to those who are younger and more vigorous and in whom the function of the limb is of paramount importance.

Notwithstanding the comparative rarity of fracture of the neck of the femur in the young and middle-aged, it is surprising how few of these operations have been performed. In the literature at my command, I have been able to find the reports of but thirteen cases, my own making fourteen; while most text-books mention the subject but casually, if at all. Out of these fourteen cases, the final results are given in but ten.

Although the operation was done by von Langenbeck as early as 1858, his patient dying of hospital gangrene, and was favorably spoken of by Trendelenburg at the German Surgical Congress in 1878, it remained for Loreta to report the first successful attempt some ten years later. In this country, Willy Meyer seems to have been the first to operate, in 1893.

THE CHOICE OF CASES FOR OPERATION is of great im-

¹ Read before the Chicago Surgical Society, May, 1904.

portance. It should be considered from three points of view,—age of the patient, resisting powers, and amount of disability.

Advanced age is a contraindication, although, if an individual were not too old and his general condition exceptionally good, operative intervention might deserve serious consideration. The greatest field, however, necessarily lies among the young and middle-aged, where operation is not only permissible, but strongly indicated.

The resisting powers deserve the most careful attention, but it should be remembered that they are sometimes better in the old than in the young. Chronic and acute derangements of various organs, particularly the kidneys and lungs, must be given due weight before recommending operation.

The amount of disability is an important factor and must of course be considered with reference to the age. A moderate limp without pain or undue loss of function would hardly be sufficient ground for operation, especially as some degree of shortening would be almost sure to remain; but if disability and suffering were pronounced, operation would be strongly indicated in favorable cases.

It is worthy of mention that at various times the open operation has been advised for recent fractures. The suggestion has not been adopted, however, by the great majority of surgeons, even in younger subjects in good physical condition, because the chances of obtaining satisfactory results by less severe and dangerous methods are too good to be disregarded.

Operation.—(a) Incision. Formerly the question of postoperative drainage was of so much importance that it led to the frequent choice of posterior incisions; but, now that more confidence exists in aseptic technique, preference can be given to the anterior incision, which seems to offer greater advantages. Access to the joint, even in heavy individuals, is adequate; no muscles or other structures of importance are divided or even endangered; the absence of a wound back of the trochanter lessens the risk of infection, and permits a



Fig. 1.-Jacobson.

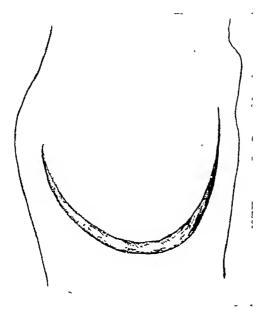


Fig. 2.—Gillette

cushion to be placed behind the bone in such a way as to prevent its dropping backward, a point of considerable importance; and, lastly, the situation of the wound facilitates the after-treatment, including the removal of stitches, without the necessity of painful and troublesome turning of the patient.

The cut should begin a short distance below and external to the anterior superior spinous process of the ilium and extend directly downward for three or four inches, the exact distance varying somewhat according to the thickness of the soft parts. (Fig. 1.) It should lie just outside the sartorius muscle, which can be retracted inward, while the fascia lata is drawn outward. The dissection should be blunt as far as possible, especially at its lower extremity. Should the surgeon, during the course of the operation, conclude to remove the head of the bone instead of reuniting the fragments, he can do so through this incision quite as readily as through any other.

I can see no advantage in incisions which curve around the tip of the trochanter, and the resulting division of muscular attachments must at times be detrimental.

The osteoplastic operation employed by Gillette and Boeckman (Transactions of American Orthopædic Association, Vol. xi, p. 241), although ingenious and giving ample access to the part, seems uselessly complicated and severe, and in case of infection might lead to necrosis or to the existence of two ununited fractures instead of one. It consists of exposing the upper end of the femur by turning up a large horseshoe flap (Fig. 2), dividing the base of the trochanter with a chain-saw and turning it upward together with its muscular attachments. At the conclusion of the operation the fragment is replaced and held by a peg of bone.

(b) Freshening of Fragments.—This includes the removal of all interposed connective tissue, which, owing to the narrowness of the working-space, may be quite difficult and accompanied by considerable oozing, as in my own case. This tissue is very tough, and cannot be scraped out, but must be cut away with scissors.

The surfaces of the fragments, which are usually abnormally soft, are easily chipped away with a chisel or scraped off with a curette, care being taken to remove as little bone as possible in order to avoid shortening of the neck and, as a consequence, shortening of the entire limb, which is apt to be considerable in spite of all precautions. Troublesome oozing may be checked by the use of pressure-sponges wrung out of very hot water. Detached splinters of bone should be removed.

(c) Fixation of Fragments.—This is an important and difficult problem. From lack of fixation came the original pseudarthrosis, and upon the degree of its attainment may depend the ultimate results. Whatever method is adopted, the trochanter should be supported from behind, as it has a marked tendency to drop backward, thus producing displacement of the fragments and outward rotation of the limb. This can be done by a cushion or by an appropriate plaster-of-Paris dressing.

It cannot be denied that simple extension, combined with trochanteric support, would be sufficient to secure union in many instances; and, in fact, I am convinced that the results in a number of reported cases have been obtained by these means alone. This is more easily understood when we remember that union has failed in many instances, not because extension has failed, but because the seriousness of the injury was not recognized and extension was not employed.

It is perhaps unwise, however, to trust to extension alone, even when combined with support of the trochanter by a plaster cast surrounding the pelvis, because there are other procedures supposed to be more certain in their results. The principal one of these is the union of the fragments by means of nails, screws, or bone or ivory pegs. These may be inserted obliquely from the incision used in opening the joint, or more advantageously through a small separate opening over the external surface of the trochanter, which permits of better fixation and more easy removal. This method of holding the frag-

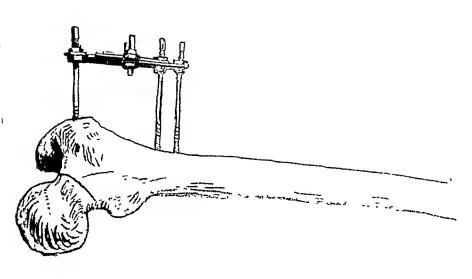


Fig. 3.-Parkhill's fixation apparatus

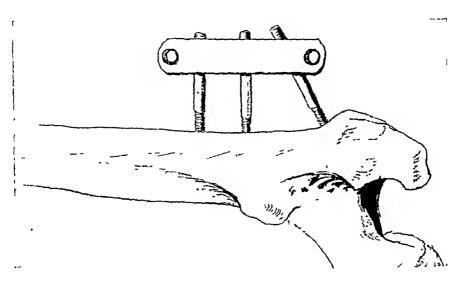


Fig. 4 -Method of securing screw in fracture of neck of femur; the wooden plates embracing screws

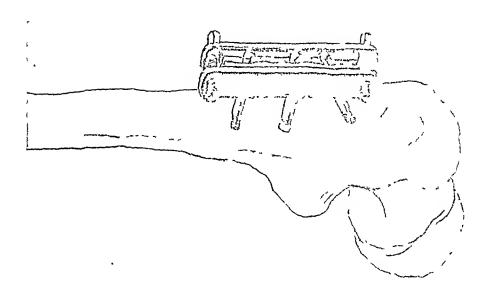


Fig. 5 -Completed screw and clamp apparatus for fixation of fracture of neck of femur

ments is supposed to accomplish three things,—fixation, coaptation, and stimulation of bone formation.

Without special consideration, it would appear that perfect immobility of the pieces of broken bone could always be obtained by nails, pegs, or screws, especially the last mentioned. But this is not true, although it seems to have been taken for granted by all operators and writers, the reason being that the upper end of the femur often becomes so extremely soft and porous that the instruments of fixation will not hold. In my own case, and it has been noted by others, this softening was so marked that the screw could be pushed directly through the bone without previous drilling, the union being thus rendered so insecure that a very moderate degree of force was sufficient to reproduce displacement.

In order to obtain thorough fixation, Clayton Parkhill suggested the use of his well-known bone-clamp (Annals of Surgery, 1898, Vol. xxvii, p. 560); although, so far as I know, the suggestion has never been put in practice. clamp is so constructed, however, that if the upper leg were inclined upward, as it would have to be, it would be very hard to fasten the wings of the apparatus together. (Fig. 3.) This difficulty may be easily overcome by making use of a much more simple and equally effective clamp which I devised some time ago and successfully employed in two cases of ununited fracture of the tibia. It consists of three or four long screws, which are inserted in a longitudinal line of holes drilled in the bone, their projecting ends being tightly held by two metal side-clamps lined with strips of wood. The efficiency of the apparatus lies in the fact that the screws bury themselves in the wood as firmly as if screwed into it. As regards the hip, it would make no difference at what vertical angle the upper screw projected from the bone, it could be easily adjusted and securely held. Such an apparatus, having its foundation two or three inches down the shaft of the femur, in solid bone, would certainly be more satisfactory than screws alone. (Figs. 4 and 5.)

The use of absorbable bone or ivory pegs is alluring be-

cause they can be left permanently in the tissues; but as a means of fixation they are less reliable than the methods already mentioned, and in case of infection, which may occur in spite of every precaution, they are difficult to remove. Wiring the fragments, although hard to accomplish properly in such deep-seated structures, would probably be preferable.

It is questionable whether two loosely fitting pegs or screws, passing through soft bone, are in any way superior to one; and the greater the number, the greater the traumatism and the chances of infection. When a bone-clamp is employed as described, one screw would appear to be sufficient.

The insertion of a coil of wire between the ends of the broken bone for a few days only, as was done by Loreta, would seem to have no theoretical justification, although in his case a good result was obtained.

When to remove the screws is a difficult question. They should remain, if possible, for several weeks, until consolidation is well advanced, unless infection occur, when they should be taken out at once. In my own case, as in one reported by G. G. Davis, fever appeared at the end of the second week. The removal of the screws, which were surrounded by infective material, caused a rapid subsidence of the symptoms.

- (d) Drainage.—Temporary drainage of the wound is indicated, although depending somewhat upon the amount of oozing. When an anterior incision has been employed, I cannot believe it is wise to incise the tissues and drain posteriorly, because of the inconvenience of turning the patient in order to change the dressing, and because of the increased likelihood of infection.
- (e) Length of Time in Bed.—This has been placed by the majority of operators at about ten weeks, although both Müller and Gillette permitted patients to get up in six weeks without apparent detriment. The longer time, however, must certainly be safer, because of the softened condition of the bone and its lack of adequate circulation.

RESULTS.—These have been, on the whole, encouraging. Nearly all operators have reported good motion and satisfactory function, although it must be acknowledged that some of the cases were not followed a sufficient length of time. There always remains, however, some shortening, varying from half an inch to an inch and a half or more. This arises from absorption of bone, from loss by freshening the fragments, and from imperfect adjustment; but it is usually not great enough to become a large factor in the final result.

Writer's Case.—A heavy, muscular man, thirty-two years of age, injured the right hip by falling on it, May 2, 1903. He was up on crutches in about four weeks, the extent of the injury not having been recognized. When I saw him on September 23, 1903, he was still unable to use the limb in walking, owing to pain in the hip and knee. There was shortening of two and a half inches with a corresponding elevation of the trochanter, although this could easily be overcome by traction, the manipulation being accompanied by indistinct crepitus.

Operation (October 10, 1903, about five months after the injury).—Anterior longitudinal incision external to the sartorius, through which the neck of the femur was readily exposed, and the fracture located near the head of the bone. With difficulty a mass of tough fibrous tissue was snipped with scissors from between the ends of the fragments, which were freshened on each side of the gap with a chisel. A small incision was then made over the trochanter externally, and a hole for the reception of a screw drilled through the base of the trochanter, the external fragment of the neck, and into the head of the bone. The "drilling," however, proved to be a mere form, for the bone was so soft that the blunt screw could have been pushed directly through it without the boring of a preliminary hole. When the screw was in place, its outer end projected between the stitches used in closing the wound. Owing to the softness of the bone, the parts, although receiving considerable support, were far from being firmly held, so that it was possible to displace them with moderate force by rotating the limb or pushing it upward.

On account of oozing, it was necessary to pack the wound with a strip of gauze, which was removed in a day or two, the

opening closed, and primary union obtained. Extension, a long side-splint, and a pad beneath the trochanter were employed. For several days the suffering was great, necessitating the constant use of morphine.

In a week or so a little infection appeared about the opening, through which projected the screw, which at the end of about two weeks caused a rise in temperature to nearly 104 degrees, accompanied by chills and much general disturbance. On removal of the screw, however, these unfavorable symptoms promptly subsided, showing that they were probably due to infection of the cancellous structure rather than the joint (Davis reports a similar experience). The subsequent recovery was rapid and uninterrupted.

The extension was removed in about eight weeks, and the patient permitted to use crutches in ten weeks. Much callus could be detected, and there was about one inch shortening. In the face of various tests, the union seemed to be sound and bony.

When the patient left the hospital at the end of twelve weeks, he could bear his weight upon the limb without yielding at the seat of the fracture, and there was satisfactory movement in the joint as regards both flexion and rotation. I examined this patient again a little over six months after the operation, and found the following condition: union apparently firm, considerable callus, flexion to nearly a right angle, rotation almost normal, and about one and a half inches shortening. There was still enough pain in the joint anteriorly to prevent the patient discarding his crutches, although it was much less than before the operation and was decreasing constantly. When not attempting to walk, the weight could be borne upon the limb with but little, if any, discomfort.

Hence, up to the present time this case has not been a complete success, the result being marked improvement only. What the ultimate outcome will be is yet to be ascertained.

OTHER CASES.—(1) VON LANGENBECK, in 1858 (Charité Annalen, 1858), operated upon an ununited fracture of the neck of the femur by incision and screws, death occurring from sepsis and hospital gangrene.

(2) LORETA (British Medical Journal, August 25, 1888). Man of thirty-six; fracture at capsular junction nineteen months previous to operation. Long incision behind trochanter. Fragments freshened by scraping. Attempted to wire fragments, but failed, and simply placed a

bundle of wires between them, which was removed in five days. Primary union. Able to walk in fifty-five days.

- (3) W. MÜLLER (Samm. klin. Vortr., No. 145, 1896, p. 929). Woman of fifty-four. Injury two and a half years previous to operation. Anterior longitudinal incision external to sartorius. Fracture in centre of neck. Freshened fragments with chisel. Drill inserted obliquely through fragments from anterior wound and left in ten days. Extension. Out of bed in six weeks. Complete consolidation in twelve weeks. At end of three and a half years could walk several hours without inconvenience. Perfect motion in joint.
- (4) W. MÜLLER (Samm. klin. Vortr., No. 145, 1896, p. 429). Mere mention of a case operated on in a similar manner to the one reported above. Results not given.
- (5) WILLY MEYER (ANNALS OF SURGERY, 1893, Vol. ii, p. 30). Man of thirty-nine. Injury ten months previous to operation. Langenbeck incision. Employed two long nails inserted through special opening over trochanter. Bone very soft. Extension eight weeks. In bed ten weeks. Bony union and good result.
- (6) R. H. SAYRE (Transactions of American Orthopædic Association, 1898, p. 247) mentions operating upon an ununited fracture of the neck of the femur in a man who had received the injury some months previously. "Incision as for resection of hip." Fragments united by a gimlet which was left in eight weeks. Good union and good functional result.
- (7) A. J. GILLETTE. Operation by E. Boeckmann. (Transactions of American Orthopædic Association, 1898, p. 241.) Man of thirty-six. Injury six months previous to operation. Through a horseshoe incision the trochanter was divided at its base and turned upward, together with its muscular attachments. Bone pegs were employed to reunite both the fragments and the trochanter. Silica spica dressing. Primary union. In bed sixteen weeks. On crutches ten days. At end of a year was walking without a cane and with satisfactory motion of joint.
- (8) A. J. GILLETTE (*Ibid.*). Woman of twenty-three. Injury fourteen months previously. Operation similar to above, except ivory pegs were used. Primary union. In bed eight weeks. At end of about one year there was one inch shortening, normal motion, and good function.
- (9) Man of thirty-six. Injury six months previously. Operation similar to above. Primary union. In bed six weeks. Result,—a little over one inch shortening, relief from pain, slight limp, able to do manual labor at end of one year.
- (10) G. G. Davis (University Medical Magazine, September, 1900). Man of thirty-eight. Injury one year previous to operation. Anterior longitudinal incision external to sartorius. Fragments freshened by gouge and curette and united by two long steel drills passed through a separate incision over trochanter. At end of two weeks temperature went to 105 degrees, with chills, fever, and sweats. Pins removed in three weeks, when septic symptoms ceased at once. Extension and fixation then applied. Up and about in ten weeks with apparently firm union and

good functional results. On March 29, 1904, Dr. Davis writes me that the fragments "again became loose after some months, and I inserted two large (three-inch) silver-plated wood screws. This hip was firm over two years after the operation, and has, I presume, remained so, or I would have heard from the patient."

- (II) G. G. Davis (*Ibid.*). Man of thirty-five. Injury six months previous to operation. Anterior longitudinal incision external to sartorius. Intracapsular fracture. Through incision over trochanter, two ivory pegs, three and two-fifths inches long, driven through fragments. Plaster dressing from waist to below knee. Primary healing. Bony union apparently and good functional result. Dr. Davis writes me (March 29, 1904) that the fracture "has become somewhat loose from the subsequent breaking or loosening of the ivory pegs."
- (12) W. W. KEEN (mere mention of unreported case in letter from G. G. Davis). A three-inch, steel, silver-plated screw employed. Result good at end of three and a half months.
- (13) G. G. Davis (private communication). Apparently firm union when case left hospital, but ultimate result unknown.

In addition to the above list, which is no doubt incomplete, F. Kammerer (Annals of Surgery, 1899, Vol. i, p. 624) alludes to a case of ununited fracture of the femoral neck in which he attempted to unite the fragments, but could not approximate them sufficiently. He accordingly abandoned the attempt and resorted to resection of the head of the bone instead.

An interesting case is also reported by M. Gangolphe (*Revue de Chirurgie*, 1899, Vol. ii, p. 763) which deserves mention, although it does not come strictly under the heading of this paper:

Man, aged thirty-nine. Injury eight months previous to operation. Intracapsular fracture with splintered neck. Divided trochanter, turned its base inward and united it to the freshened upper fragment of the neck. After union had taken place, a bony support was obtained, against which the shaft of the femur rested. At the end of three years (Revue de Chirurgie, 1901, Vol. ii, p. 585), the patient could walk long distances and carry heavy loads.

THE TREATMENT OF FRACTURE OF PATELLA.1

WITH REPORT OF RESULTS AFTER ARTHROTOMY AND SUTURE.

BY J. ALEXANDER HUTCHISON, M.D.,

OF MONTREAL,

Lecturer in Clinical Surgery, McGill University; Attending Surgeon, Montreal General Hospital.

My purpose in the present paper is to record my own personal experience in seven cases, being the total number under my care during the past nine years, one of which was treated by the non-operative plan by a posterior splint and strapping; the other six by the direct open method with wiring of the fragments.

The operative treatment of this condition has an historical value quite apart from the benefits which may follow it. In pre-antiseptic days any attempt at an operative treatment of fracture of the patella, which included opening the joint, had been followed in the majority of cases by disastrous destruction of the joint, even to amputation of the thigh, and death from pyæmia. Lord Lister endeavored to impress the truth of his opinions in regard to the antiseptic treatment of wounds by operating upon a series of fractures of the patella by the open method, and demonstrated by the success of his cases that it was possible to perform this operation with comparative safety.

He was not, however, the first to perform the operation according to his own method; Dr. Hector Cameron, of Glasgow, a former house surgeon of Lord Lister, did so on March 5, 1877, leaving the ends of the wire projecting through the wound, and drainage into the joint. Although bony union

57 I

¹Read at stated meeting of the Montreal Medico-Chirurgical Society, April 1, 1904.

was not obtained, the parts were closely approximated, and the patient recovered with a useful limb.

Lord Lister's first case was in October of the same year, the details of the operation being the same as in Dr. Cameron's case. His second case was two years later.

On October 29, 1883, Lord Lister 1 delivered before the Medical Society of London an address on his experience to that date, which included seven cases, six of which he was able to bring before the Society. At this time he claimed that these cases demonstrated the success of his method and its easy accomplishment, providing no disaster occurs. Before commencing his first operation, he remarked to those about him that "No man was justified in performing this operation unless he could say with a clear conscience that he considered himself morally certain to avoid the entrance of any septic mischief into the wound."

Fracture of the patella may be divided into three classes, as follows: First. Indirect, or those due to muscular violence, a tear. Second. Direct violence, a blow. Third. A combination of the two, a tear and blow.

When this fracture occurs by muscular contraction the knee-joint is usually slightly flexed, bringing the articular surface of the patella, at about its centre, in contact with the head of the femur, producing a transverse fracture, dividing the patella into two fragments, the upper one most frequently the larger of the two. After the bone fractures, strong muscular contraction continues, producing a wide lateral tear in the aponeurosis.

Again, the fracture may be by direct violence, from the patient falling, the patella coming in contact with some hard substance, producing an irregular fracture, usually stellate, this involving the lower third of the bone. In this class of injury the damage to the aponeurosis may be very slight, occasionally an irregular laceration with one or more independently punctured wounds is seen. There is frequently no lateral laceration. Sometimes there is a combination of these two conditions, as in Case III of my series.

This third form occurs, first, by muscular contraction, the pain and loss of function permitting the patient to then fall to the ground, producing the above-mentioned condition; that is, there is a transverse fracture; a wide laceration of the aponeurosis; and one or more independent irregular tears involving the lower and anterior aspects of the aponeurosis.

This latter condition must be reckoned with in any operative measure to be considered, on account of the severe contusion to the soft parts, producing more or less hæmorrhage and resulting blood-clot, and greater interference with the blood supply, the whole tending to produce necrosis of the soft parts.

In the first class there are two points of importance: First. The wide laceration of the aponeurosis involving the lateral aspects, permitting wide separation of the fragments. This laceration usually occurs at a point below and parallel to the fracture, permitting the upper free portion to fall into the joint cavity between the fracture surfaces. This has been especially pointed out by Macewen² and more recently by König.⁴

Second. Tilting forward of the fragments so that the fracture surfaces point away from the cavity. The displacement of the upper fragment is due to muscular contraction drawing more on the anterior than the lateral aspects, and in the lower fragment it is probably due to loss of support, permitting the fragment to fall downward, and possibly also from pressure of blood-clot and serum within the cavity. In several of my cases the large amount of blood-clot seemed a sufficient explanation in itself for the tilting forward of the lower In the second class there is usually little or no separation of the fragments owing to the absence of the transverse laceration, but there is, as above mentioned, much more contusion to the soft parts in the vicinity. In addition to the subcutaneous injury from contusion, the surface with which the patient comes in contact in his fall may produce serious injury to the skin, including wounds leading down to the injured bone, converting the injury into a compound or

complicated wound. In the third class the combination of conditions is of importance, as, bearing on the future treatment, the contused condition of the lower part of the aponeurosis and the numerous hæmorrhages are an additional element of danger should the open method of treatment be followed. The normal blood supply to the patella is limited, and in fracture, particularly where the lateral aspects are involved, this is much interfered with, and has been thought to play some part in the difficulty in obtaining bony union. In all cases there is more or less acute synovitis accompanied by effusion.

The treatment is divided into non-operative and operative, and this latter further divided into early and late cases. If a non-operative treatment is followed, we must expect that a complete return of function cannot be obtained. There is always inability to completely control the movements of the limb. The patient is unable in many cases to undergo the fatigue of long walking or climbing, and in most cases there is an inability to control the limb in walking down hill, and particularly in walking down stairs. Although there may be close approximation of the fragments at first, there is a tendency to continued separation, and during the middle adult years while the patient may notice little difference in the affected limb in carrying out the ordinary daily duties, as age creeps on and muscular tone lessens, the muscular control diminishes; exercise produces fatigue, and in a moment of emergency the limb will not respond, thereby permitting a fall which may be the cause of serious injury to other parts of the body. On the other hand, if operative interference is permitted, it can only be carried out in chosen cases, especially those cases where there is transverse fracture with wide laceration of the aponeurosis.

The operation is called for more particularly in cases of the first and third classes of those above mentioned. It should be recommended only in persons under fifty years of age, in good general health, who are free from alcoholic taint, and not the subjects of constitutional or organic disease.

Occupation should also be considered. Persons who lead a sedentary life suffer less from the disability resulting from the non-operative treatment than those engaged in active work. A practical clinical feature demonstrating the necessity for operation is the ability of the patient to extend the leg. (There was total inability to extend the leg in all my cases.) Mikulicz ⁵ refers to this as a guide, at the same time pointing out that pain may prevent movement where the quadriceps is still intact. He operates in classes one and three, but not in class two unless there is some exceptional reason. He practises the transverse incision, using the brass wire instead of the silver as formerly, on account of its great strength.

Powers ⁶ contributes an exhaustive article, in which he records the opinions of seventy-one surgeons, a summary of which shows that four would use Malgaigne's method, seventeen are opposed to operation, nine would operate unless there were distinct contrary complications, forty-one would operate in selected cases, such as wide separation and comminution.

In more recent literature I think the tendency is to operate more frequently.

Of the non-operative measures: Approximating of the fractured bone by strapping and a posterior splint has been long practised, and apparently meets the indications in certain Malgaigne's hooks and its various modifications are not now in as much favor as formerly, although they are still used to some extent in France. The method of Tilanus, introduced in 1885, sometimes called the "Dutch method," consists of the following (I quote from Powers 6): "During the first twenty-four or forty-eight hours the limb is elevated and the joint compressed by an elastic bandage. On the second or third day massage is commenced. The upper fragment is fixed by the fingers of one hand, while with the other gentle pressure is made from the knee along the thigh muscles. Massage is carried out for from eight to fifteen minutes twice In the interval the fragments are held in position by straps of plaster, and the limb is so elevated that the extensors of the thigh are relaxed and the return of function favored.

Passive motion is begun early. The patient should be up and about on crutches by the eighth or tenth day."

Of the operative methods: The objection to the so-called subcutaneous method is that at best the parts are only brought into apposition and held there, and there is the same uncertainty as to the final result as in any of the non-operative methods. In addition, there is the danger of infection through the cutaneous wound. Of these the method of subcutaneous suture of the aponeurosis above and below the patella was originally practised by Butcher.⁷

Barker's operation 8 consists in passing a heavy silver wire completely around the fractured bone from before backward through small incisions in front of the joint. The wire is passed round by means of a special needle suggested by Mr. Barker, and the suture left permanently in. Of Barker's operation I have no personal knowledge, but the wonderful success which the author has obtained commands our respect.

In Kocher's operation the wire is temporarily passed behind the fractured surfaces and tied on a pad, where it is left for from two to three weeks and then withdrawn.

The objections which have been offered to both are that a full view of the parts is not obtained; that the fracture surfaces are not inspected; that the blood-clot is not removed from the joint; that the torn aponeurosis is not removed from the fractured edges; that a foreign substance is left adjacent to the articular surfaces of the patella and passing through the front of the joint; and that the passing of the needle through the joint in introducing the wire is not without some danger.

Of the open method: There are four different incisions practised. First. The linear perpendicular incision about three inches long, having its centre opposite the fracture line. Second. The semilunar incision with convexity upward. Third. The semilunar incision with convexity downward. Fourth. The semilunar incision with convexity inward.

Of these the linear incision has now been superseded by the semilunar. Of these the second, in my opinion, is apt to interfere with the return of circulation and lead to some ædema, or even necrosis, of the flap. (This was seen in Case II). Of the third: I have followed this in my recent cases and have found it satisfactory. The objection that it is apt to leave a scar opposite the tuberosity of the tibia can be overcome by having the transverse portion of the incision above this point.

I have no experience of the fourth. It has been practised by my colleague, Dr. Armstrong, who considers that it lessens in a measure the interference with lateral circulation. This flap is lifted and the parts beneath are brought into view; the fracture surfaces cleansed of any intervening tissue and blood-clot, and brought together either by a single suture through drilled openings, or by two lateral sutures. These sutures may be of wire, silk, chromicized catgut, or kangaroo tendon.

The advantages of this open method are that it permits at once of a complete inspection of the field of operation; an accurate knowledge is obtained of the fracture or fractures in the bone, and the extent of the laceration of the aponeurosis. It permits of the free removal of blood-clot from the joint cavity, and of the approximation of the fractured surfaces, more particularly permitting one to see that the fracture surfaces are free from all intervening tissue. In considering the disadvantages, one must admit, in view of published statistics, that even in the hands of careful operators disastrous results have followed. These, however, may possibly be explained. In the first place, I think it must be admitted that the operation should never be performed except in the hands of fairly experienced operators who are surrounded by a technique with which they are familiar, and that it should only be done in selected cases, especially where there is bulging of the synovial sac at the end of a week or ten days' observation, during which period the limb has been elevated and appropriate local treatment carried out, such as an ice-bag applied to the knee. (This distention of the sac was present in all my cases.) When it is possible to recognize tilting forward of the fracture surfaces, and where there is separation of the fragments with inability

to extend the leg. In late cases, where there is wide separation of the fragments and marked loss of function after a fair trial of the usual non-operative measures.

In my series I have met with all the above conditions, more particularly the laceration of the aponeurosis at a point below the fracture line in the bone, permitting a curtain-like band of thinned-out, shreddy tissue, in one case as much as two inches, to fall towards the centre of the joint and between the fracture surfaces. In each case that this was noted, this fringe was closely adherent to the upper fragment intimately mixed with more or less organized blood-clot requiring active curetting of the fracture surfaces before the bone could be properly exposed. The amount of blood-clot found within the joint, even in late cases, was also somewhat of a surprise to me. The claim that this can be removed by aspiration or by a trochar I am not able to concur in. How much of it would be ultimately absorbed it is impossible to say. It is fair to assume, however, that portions of it become organized and play an important part in the development of adhesions, and it is admitted that it is a danger in recent cases should infection be threatened. I have found firm, hard clots occupying the anterior part of the joint cavity and separating the fracture surfaces that were with difficulty removed. In dealing with the danger of infection: I think too much importance has been attached to this accident as applied to wiring the patella, and too little to the same accident as seen in other fields, notably in operations involving the peritoneum. It must be admitted that not infrequently, at the hands of skilled surgeons surrounded by well-tried operating-room technique, the accidental infection of the peritoneum in doing an interval appendectomy or an exploratory laparotomy is seen with fatal results. held that this infection may come from the air as well as from some fault in the technique. These accidents are unfortunate whenever they happen, but I question if it is fair to condemn one operation without condemning all. Without operation, although a fairly useful limb is obtained, it is never perfect; the individual is at a disadvantage throughout the rest of his

life. In the case of workmen, men having to carry heavy weights, the loss of function is frequently progressive, often incapacitating the subject from following any of the ordinary laborious occupations; on the other hand, one is able to get such complete restoration of the function by operation that it is impossible for an ordinary observer to recognize any defect, as in Cases I, IV, and V. Bahr 9 reports that in an analysis of forty-four old cases, 35 per cent. showed complete disability so far as gaining a livelihood was concerned. On the other hand, in a favorable case which terminates satisfactorily, complete restoration of function of the limb is obtained; in some cases so perfect that the patient is unable to detect any difference, as in Case IV.

Regarding the time one should operate: My practice has been to allow the acute symptoms of synovitis and injury to the surrounding tissues to subside, this usually taking from a week to ten days. This, however, may be an unnecessary precaution, many preferring to operate as soon after the accident as possible, notably Watson Cheyne.¹⁰

After-Treatment.—A light posterior splint for a week or two, after which time the patient should be up and about, using crutches or a stick. At the end of four weeks all dressings should be removed, except a light protective bandage. Massage and passive movement should be carried out after the removal of cutaneous sutures, that is, after ten days. If the wire suture should cause any superficial irritation, it may be removed after six weeks by a small incision with the aid of local anæsthesia. (In none of my cases has this been necessary, although I may have to do it in Case VI.)

In my series the following points of technique were particularly observed:

The operation was done quickly. Rubber gloves were used. As soon as the joint was opened, sterilized gauze saturated in normal salt solution was carefully packed into the cavity. Continuous irrigation with salt solution was kept up. The only foreign substance, other than the gauze, introduced at any time during the operation was a forceps, or curette, to

lift out blood-clot. Special care was taken in adjusting the torn aponeurosis, particularly in getting careful apposition on the lateral aspects. The postoperative treatment included elevation of the whole limb. Early massage and passive movement.

I append an analytical digest of the histories of the seven cases which form the basis of the present communication.

Case I.—M. C.; male, twenty-four years; plumber. of Injury.-June 4, 1895. Nature of Violence.-Direct. Diagnosis.—Transverse fracture, separation of one-half inch. Marked synovitis. Operation; Days after Injury.—Fifty-six days. layed a few days owing to pustular dermatitis due to blister plaster having been applied before coming under our notice. Incision.— Median linear. Condition found.—Of bone: Stellate fracture upper fragment, two-thirds of whole, fracture surface of lower facing forward. Of soft tissues: Large transverse rupture of aponeurosis, mass of fibrous tissue between fragments. Suture Material.—Silver wire at first introduced but broke, and was finally replaced by five strands of silkworm gut through one centrally drilled opening. Approximation of Fragments.—Impossible until a silk suture was passed through aponeurosis above and below patella and tied. Postoperative Treatment.-Plaster of Paris for six weeks. Result at Present Date.—Complete restoration of function; has been regularly at work since three months subsequent to operation. Recent radiograph shows perfect bony union. (Fig. 1.)

Case II.—H. R.; male; twenty-nine years; delivery driver. Date of Injury.—November 20, 1902. Nature of Violence.—Indirect and direct (fell on knee after he heard and felt the break). Diagnosis.—Transverse fracture, low down; marked synovitis; severe injury to superficial soft tissues. Operation; Days after Injury.—Eleven days. Incision.—Semilunar, convexity upward. Condition found.—Of bone: Transverse fracture upper fragment three-fourths of whole, fracture surface of both fragments facing forward. Of soft tissues: Large oblique rent extending from a point about two inches below fracture line on inner side to edge of fracture on outer side. Fringes of this, two inches long, hanging over fracture surface of upper fragment. Suture Material.—

Fig. 1.-Radiograph showing result of suture of fractured patella (Case I).

Fig 2-Result of patella suture (Case II).

FIG. 3.—Fracture of patella; condition before suture (Case III).

Fig. 4 -Fracture of patella, condition before suture (Case IV)

Single silver wire through centrally drilled openings. Approximation of Fragments.—Easily brought together. Postoperative Treatment.—Plaster of Paris for about six weeks. Result at Present Date.—Superficial suppuration from original damage of soft parts, synovitis present for some weeks. Some months later, while adhesions were being broken down under ether, patella again fractured, partly through old fracture line and partly below. Posterior splint and straps at once applied for six weeks. Good union without separation. Patella freely movable; movement of joint is now normal; has been driving laundry delivery regularly and with comfort. Recent radiograph shows that bony union is not complete, a small fissure being present close to the anterior aspect; this is probably due to the second fracture. (Fig. 2.)

Case III.—J. McN.; male; thirty-three years; laborer. Date of Injury.—August 24, 1902. Nature of Violence.—Probably direct. Diagnosis.—Transverse fracture, treated with strapping and posterior splint; unable to walk at end of four months; separation of three-fourths of an inch. Operation; Days after Injury.—One hundred and twenty-nine days. Incision.—Semilunar incision, convexity downward. Condition found.—Of bone: Transverse, two-thirds in upper fragment, lower fragment facing forward. (Fig. 3.) Of soft tissues: Thin fibrous band connected separated fragments. Suture Material.—Silver wire through two laterally drilled openings. Approximation of Fragments.—Easily brought together. Postoperative Treatment.—Plaster of Paris for five weeks. Result at Present Date.—Man has been regularly at work and reported that he was perfectly well. Have been unable to get recent radiograph.

Case IV.—F. L.; male; fifty years; carpenter. Date of Injury.—December 19, 1902. Nature of Violence.—Direct. Diagnosis.—Transverse fracture. Operation; Days after Injury.—Sixteen days. Incision.—Semilunar incision, convexity downward. Condition found.—Of bone: Transverse one-third in upper fragment, both fracture surfaces facing forward. (Fig. 4.) Of soft tissues: Aponeurosis torn below line of fracture; upper portion lying between fragments in numerous bands and threads. Suture Material.—Silver wire through one centrally drilled opening. Approximation of Fragments.—Easily brought together. Postoperative Treatment.—Plaster of Paris about three weeks. Massage and passive movement at end of third week. Result at

Present Date.—Complete restoration of function. Radiograph shows bony union. (Fig. 5.)

Case V.—T. L.; male; forty-one years; stonemason. Date of Injury.—November 22, 1903. Nature of Violence.—Direct. Diagnosis.-Well-marked transverse fracture, synovitis. Operation; Days after Injury.—Eight days. Incision.—Semilunar incision, convexity downward. Condition found.—Of bone: Transverse, with comminution of lower fragment, three-fourths in upper fragment. (Fig. 6.) Of soft tissues: Aponeurosis torn below line of fracture, upper portion lying between fragments in numerous bands and threads. Large blood-clots in joint cavity. Suture Material.—Chromic catgut suture through laterally drilled openings in upper fragment; passed between comminuted lower fragments out through the patellar ligament; reintroduced and passed between the bone and aponeurosis on extreme lateral aspects and out through aponeurosis to a point close to top of opening in upper fragment and tied. Approximation of Fragments.—Easily brought together. Postoperative Treatment.—Posterior splint and elevation of thigh for a few days. Early massage and passive movement. Result at Present Date.—Gradual return of function; patella freely movable; no pain. Have been unable to get recent radiograph.

Case VI.—E. C.; male; twenty-two years; laborer. Date of Injury.—December 29, 1903. Nature of Violence.—Indirect. Diagnosis.—Transverse fracture; marked synovitis; separation three-fourths of an inch. Operation; Days after Injury.—Thirteen days. Incision.—Semilunar incision, convexity downward. Condition found.—Of bone: Transverse fracture. (Fig. 7.) Of soft tissues: Aponeurosis torn below line of fracture, upper portion lying between fragments in numerous bands and threads. Large blood-clot in cavity. Suture Material.—Silver wire through two laterally drilled openings. Approximation of Fragments.—Easily brought together. Postoperative Treatment.—Posterior splint and elevation of thigh for a few days, followed by early massage and passive movement. Result at Present Date.—Walked without assistance or support in two weeks; complete return of function. Recent radiograph (Fig. 8) shows shadow produced by new bone.

CASE VII.—J. B.; male; thirty-two years; beer-bottler. Date of Injury.—October 10, 1902. Nature of Violence.—Indirect. Diagnosis.—Transverse fracture; slight separation; marked

Fig. 5.—Final result after suture of fractured patella (Case IV)

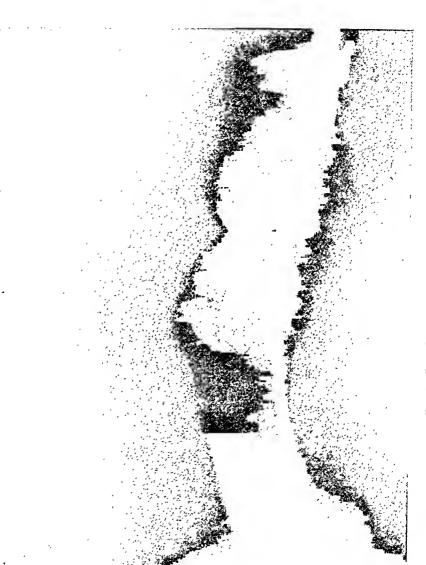


FIG. 6.—Comminuted fracture of patella (Case V).

Fig. 7.—Fracture of patella; condition before arthrotomy and suture (Case VI).

Fig. 8.-Fracture of patella; condition after suture (Case VI).

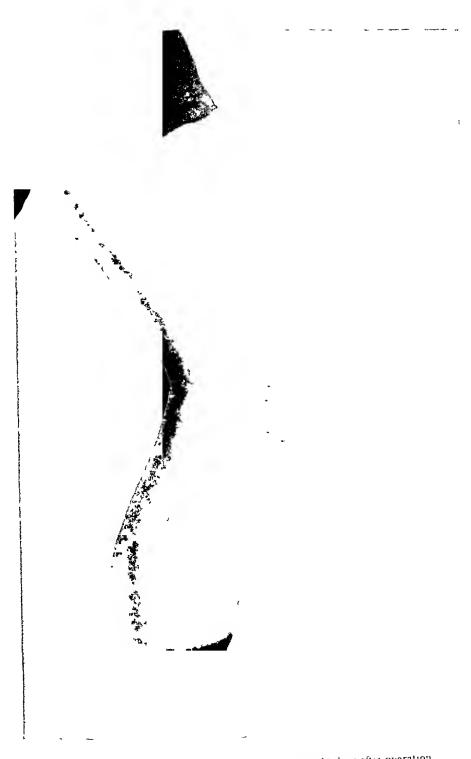


Fig. 9.—Showing skin cicatrix in Case VI twenty-eight days after operation

Fig. 10 -- Fracture of patella, recent, treated by non operative measures (Case VII)

FIG 11.—Ultimate result in Case VII, treated by non-operative measures; limb extended



Fig. 12.-Ultimate result in Case VII, treated by non-operative measures; limb flexed.

synovitis; eversion forward of lower fragment; crepitus easily elicited. *Treatment*.—Strapping, posterior splint, elevation of leg, massage. *Result at Present Date*.—Separation of fragments in repose about two and a half inches (Figs. 11 and 12), function good. Walks with some lameness, and is unable to control limb in stepping down from an elevation, as in walking down stairs.

Of the six cases operated upon all walked without lameness, and are able to go up and down stairs without any noticeable difficulty. The one case that showed lameness, namely, that unoperated upon, was unable to step down from a chair, although he has what is called a good result.

My thanks are due to Mr. W. P. Watson, director of the X-ray laboratory of the Montreal General Hospital, for the excellent radiographs he has supplied.

REFERENCES.

¹ Lancet, 1883, page 761.

²Lancet, November 17, 1883.

⁸ Annals of Surgery, March, 1887.

^{*}Fractures and Dislocations, Helferich.

⁸ British Medical Journal, December 13, 1902.

⁶ Annals of Surgery, Vol. xxviii.

British Medical Journal, September 26, 1896.

⁸ British Medical Journal, April 18, 1896.

^{*} Fractures and Dislocations, Helferich.

¹⁰ Cheyne and Burchard, Part 3.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, May 11, 1904.

The President, HOWARD LILIENTHAL, M.D., in the Chair.

MULTIPLE RESECTION OF INTESTINES IN CHILD SIX AND ONE-HALF YEARS OLD; POSTOPERATIVE OBSTRUCTION, WITH A THIRD ANASTOMOSIS; RECOVERY.

DR. JOHN F. ERDMANN presented a boy, six and one-half years old, who was admitted to Gouverneur Hospital on February 30, last, about 9 P.M. The history obtained was that some time between six and eight o'clock that evening he was run over by a wagon, the wheel or wheels passing from the anterior superior iliac spine of the left side upward and obliquely across the abdomen. A contusion about three inches long by an inch and one-half wide was seen in the vicinity of the left anterior superior iliac spine.

At 4 P.M. on the following day, when Dr. Erdmann first saw the patient, his temperature was 101.2° F.; pulse, 128. The abdomen was rigid and distended; there was pain on palpation. The patient had vomited; his bowels had not moved.

Through a median incision, a tear two inches long was found in the left peritoneal layer of the mesosigmoid. Further search revealed a mass of intestine, fully ten inches long, from which the mesentery was torn off, leaving a triangular gap with a base of about four and a half inches. The mid-portion of this section contained a gangrenous area about one by two inches in size. A second section of the intestine, in close proximity, was found with a triangle of its mesentery ecchymotic and gangrenous. The base of this was fully two and a half to three inches long. The intestine supplied by the vessels of this portion of mesentery, about five and a half to six inches long, was gangrenous in several small areas, and at each end of the destroyed mesentery the intestinal loop had a peculiar, cordlike constriction. These two sections of intestine were excised and anastomosed with Murphy buttons. The abdomen was then closed without drainage, the entire operation taking forty minutes.

The boy's reaction to the operation was favorable. The first button was passed on the ninth and the second on the twentieth day. About the fifteenth day, the patient's abdomen began to swell and his countenance became anxious. There was total obstruction for twenty-four hours, when he again began to improve, and continued to do so until the 28th of March, when some of his family smuggled fruit and cake to him, of which he ate his fill, and which was followed by profound obstruction, tympany, and vomiting. The abdomen became rigid and painful; pulse, 140.

On March 30 the abdomen was again opened, and it was found that a complete separation had occurred between the ends of the formerly apposed and anastomosed sections. A pouch or walled-off pocket of about two inches long and fully two and a half inches in diameter was present, and by reason of overdistention this ruptured and permitted of sufficient leakage of intestinal contents to create the peritoneal manifestations. Owing to adhesions, it was impossible to bring these separated ends into the abdominal wound. They were thereupon anastomosed laterally by dropping one-half the button into each end, then taking a purse-string suture about each end fully three-eighths of an inch away from the free edge, and inverting the open end. As the sutures were drawn tight, the button halves were forced together by nicking the gut over the stem of the female half, and then forcing the male stem, covered by the intestinal wall, into it. The cavity was wiped out, a small drain placed in the vicinity of the anastomosis, and the wound sutured. The patient began to improve immediately, and had entirely recovered by May 1. The third button was passed ten days after its insertion.

STONE IN THE PELVIC URETER (FEMALE).

Dr. George E. Brewer presented a woman, forty-three years old, who was admitted to Roosevelt Hospital in the autumn of 1903. Fourteen years before she first experienced an attack of pain in the lower left abdomen; this attack lasted six days. Five years later she had a similar attack lasting twelve hours. This time the pain radiated to the groin and thigh, and there was a sense of numbness in the external genitals on the same side. Since that time she had had about a dozen similar attacks, with more or less constant discomfort in the flank and groin. In one of these attacks there was moderate hæmaturia. Three years ago she underwent an operation on the left ovary, which was followed by a period of relief for several months. The pain, however, recurred, and during the past two years it had been at times severe and compelled her to give up her work.

When the patient was admitted to the hospital she had an extensive ventral hernia at the site of the previous operation. There was moderate tenderness over the left kidney at a point two inches below and to the left of the umbilicus, in the neighborhood of the external abdominal ring, and, by vaginal examination, in the left half of the roof of the pelvis. These points of tenderness varied somewhat on different occasions, and at times none but the kidney tenderness could be elicited. The urine was cloudy, containing a faint trace of albumen and considerable pus. While in the hospital she had an acute attack of colic, the pain radiating to the groin and thigh, but without hæmaturia or evidences of hydronephrosis. An X-ray examination of the kidney was negative. The attack of colic was so characteristic, however, that an exploratory operation was advised.

Under ether anæsthesia, a generous oblique incision was made in the flank, exposing the kidney and upper part of the ureter. The kidney was incised, the finger passed into its pelvis and every calyx explored, with negative result. A flexible, metallic ureteral sound was passed into the ureter and could be introduced to the wall of the bladder; beyond that point it could not be pushed. There was no feeling of a foreign body touching the sound, its failure to pass into the bladder being apparently due to stenosis of the ureteral orifice rather than to obstruction by a calculus. To verify this, however, the incision was extended

to the inguinal region, and the ureter followed down with the finger to its junction with the bladder. As no stone could be felt, and as the injection of a solution of methylene blue into the pelvis of the kidney immediately appeared in the bladder urine, further search was abandoned. The wound was closed by layer sutures, a small cigarette drain being left, extending to the kidney incision.

The wound healed kindly, and several weeks later the patient submitted to an operation for the cure of the ventral hernia. While she was still in bed from the latter operation, another attack of colic occurred similar to those she had experienced before. After her recovery from the last operation, another X-ray picture was taken obliquely through the pelvis, which showed the presence of a calculus in the lower end of the ureter. The patient refused further operative treatment and was discharged from the hospital. Three or four months later she experienced an attack of acute, left-sided pain, accompanied by chills, fever, and sweats. During the attack, the region of the left kidney was exquisitely tender; the kidney was apparently enlarged from distention of its pelvis. This attack subsided in about one week. Two or three weeks later she was readmitted to the Roosevelt Hospital.

Under ether anæsthesia, the urethra was dilated until it admitted the forefinger. With this the region of the left ureteral opening was palpated, and a small, oval calculus distinctly felt beneath the mucous membrane. The bladder was then distended with ten ounces of sterile salt solution. The bladder was opened above the pubes and its walls retracted with three large abdominal retractors. A bent probe passed through the left ureteral orifice touched the stone. The orifice was then slit up for a distance of a quarter of an inch, the stone readily seized with the forceps, and withdrawn. After thorough irrigation, the bladder was closed tightly with three layers of chromicized catgut, the other structures approximated, and the cutaneous wound partly closed with silk. A small gauze drain was left, extending to the cavity of Retzius. The patient was catheterized every two hours for the first three or four days. The wound healed kindly; there was no leakage; the patient had since been entirely free from pain.

STONE IN THE PELVIC URETER (MALE).

Dr. Brewer presented a man, thirty-four years old, who was admitted to the Roosevelt Hospital in March, 1904. When he was eight years old, he experienced an attack of right-sided colic, the pain radiating from the flank to the groin, glans penis, and testis. Since that time he has had many similar attacks. At thirteen years of age he had a very severe attack, which lasted five days and was accompanied by the passage of red urine. Eleven years later he had another severe attack which lasted six days. In none of these attacks was there any apparent swelling in the region of the kidney. Three years ago an X-ray picture taken of the kidney region was negative.

Up to one year ago the patient was under the care of Dr. George K. Swinburne, of this city, who informed Dr. Brewer that the urine had always been clear and free from any evidence of renal or bladder infection. Shortly after this the patient visited a dispensary, where a sound was introduced for purposes of exploration. This was immediately followed by an acute infection of the bladder, and since that time the urine had never been free from pus. Six months ago the right kidney was explored at the City Hospital. No stone was found, but, as the kidney was somewhat movable, nephrorrhaphy was done. No relief followed this procedure, and during the past five months the patient had suffered more or less constant pain in the right inguinal region, chiefly located at a point near the external abdominal ring. Three days ago he experienced another severe attack, which was so acute in character that he was unable to sleep, and for two days he rolled about on the bed and floor, screaming and vomiting. The urine was albuminous and turbid from pus. There was slight tenderness over the kidney and ureter, more particularly over its lower portion. An X-ray examination revealed the presence of a stone in the pelvic ureter, near the spine of the ischium.

Under ether anæsthesia, a curved incision was made about two inches about Poupart's ligament, and the muscular layer divided until the peritoneum was reached. This was retracted inward and stripped from the side wall of the pelvis, freely exposing the iliac vessels and ureter. The ureter was easily followed into the pelvic cavity, and the stone was found about one inch below the brim of the pelvis. Above this point the ureter was

dilated to the size of the forefinger and considerably thickened. The stone was easily pushed upward to a more healthy portion of the ureter and extracted through a small, longitudinal incision. This incision was then tightly closed with a single row of fine, chromicized catgut sutures. Over this was placed a mass of subperitoneal fat, which was also sutured to the ureteral wall. After this the parts were allowed to fall into place and the wound united by layer suture. A small cigarette drain was left in the lower angle of the wound, extending to the subperitoneal space.

The patient's recovery was uneventful. There was no leakage. He was discharged on the twenty-fifth day after operation.

DR. LILIENTHAL said that he had a case under his observation at present in which the symptoms pointed to the presence of a stone in the pelvic ureter. A few days ago, after an injection of indigo-carmine in the gluteal regions, both ureters were catheterized. The urine drawn from the left side, where the symptoms were practically nil, escaped freely and contained plenty of coloring matter. On the right side, where the kidney was rather large and movable, very little urine escaped, and this contained scarcely any coloring matter. This was probably due to the fact that the kidney on that side was not secreting. One of the symptoms that had led to the suspicion of stone was hæmaturia. X-ray pictures of both kidneys failed to show the presence of stone.

DR. Brewer said that about a year ago he saw a case in which the X-ray disclosed the presence of a ureteral calculus. In spite of severe and repeated attacks of colic, the patient refused operation. One night, during such an attack, he drank two quarts of Poland water within an hour, and after another hour of excruciating pain the calculus was spontaneously expelled.

About eight weeks ago, Dr. Brewer said, he was called to see a young woman who was supposed to have appendicitis. She was having a good deal of pain, which was located exactly over the external abdominal ring. He decided that the case was not appendicitis, and advised against operation. Six weeks later he was again called to see her. He was still convinced that the case was not one of appendicitis, but, as the pain had lasted about two months, an exploratory operation was deemed justifiable. The patient was sent to the hospital and an X-ray picture taken, which revealed a stone in the ureter, and thus cleared up the diagnosis.

ADENOMA OF AN ACCESSORY THYROID, CAUSING MARKED TRACHEAL STENOSIS.

Dr. Brewer presented a man, fifty-two years old, a physician, who first came under his observation in the latter part of March, 1904.

Some three years ago, on exertion, he first noticed slight difficulty in breathing. He attributed this to lack of exercise and progressively increasing body weight. Some months later it was noticed that there occurred occasional attacks of rather pronounced dyspnœa, always following some unusual exertion. Believing that the trouble was asthmatic in character, his treatment consisted of the usual remedies for this condition. During the past six months the difficulty in breathing had greatly increased, the dyspnœa becoming almost continuous. At certain times it was intense, and would be accompanied by cyanosis. This so interfered with his work that he at last consulted Dr. Francis J. Quinlan, of this city, who on examination with the laryngoscope readily detected a very decided encroachment upon the caliber of the trachea by an oval mass apparently springing from the right half of the tracheal wall. This tumor was smooth, oval, and covered, apparently, with healthy mucous membrane. It left a semilunar tracheal aperture about a quarter of an inch in diameter. The patient was also seen in consultation by Dr. Holbrook Curtis, who verified the diagnosis and referred him to Dr. Brewer for treatment.

In addition to the above findings, Dr. Brewer noticed a very slight bulging at the root of the neck, to the right and just above the sternoclavicular articulation. On deep palpation, a hard, oval mass was felt extending into the mediastinum. Moderate pressure on this mass caused an immediate increase in the dyspnæa, and a greater degree of pressure produced absolute tracheal obstruction. From these findings, the diagnosis was made of an extratracheal tumor, producing a marked indentation of the right wall of the trachea.

As a course of potassium iodide had already been tried without any improvement, an immediate operation was advised.

During the following four or five days, while the patient was arranging his affairs preparatory to entering the hospital, the dyspnœa was markedly increased. He was unable to lie down, and on the night before entering the hospital his symptoms were

so urgent that a brother physician passed the night in his house administering oxygen and stimulants freely. On the following afternoon he was again seen at the hospital by Dr. Brewer, in consultation with Drs. Quinlan and Curtis. The symptoms were so urgent at this time that it was decided to operate immediately, as it was feared he could not survive until the following morning.

In view of the alarming dyspnæa and the difficulties of the operation, it was decided to intrust the anæsthetic to Dr. Thomas L. Bennett, who promptly responded and administered chloroform. The patient at first took the anæsthetic kindly, but as soon as the position of the head was changed to allow the performance of a preliminary tracheotomy, the dyspnæa became extreme, with grave cyanosis.

An incision was made in the median line from the cricoid to the suprasternal notch, and thence continued downward towards the right in a curved direction for about three inches. The tissues overlying the trachea were rapidly divided and retracted, until the isthmus of the thyroid was exposed. This occupied practically the entire space between the cricoid and the sternum, and was exceedingly voluminous and vascular.

Considerable delay was caused by the application of a number of mass ligatures, so that the thyroid tissues could be divided to expose the trachea. While this was in progress the patient ceased to breathe and the skin became livid. As the cut surface of the thyroid was bleeding profusely, it seemed unwise to make an attempt to open the trachea, which was pushed well to the left by a large, encapsulated tumor which lay beneath the thyroid gland, partly within and partly above the mediastinum. About a minute and a half were consumed in arresting the hæmorrhage, during which time the respiration was completely arrested. As soon as the hæmorrhage was controlled, an incision was made into the trachea, and an attempt made to introduce a tube. Owing to the narrowness of the lumen, only the smallest-sized infant tube could be introduced. Respiration was at once re-established, and the patient's color improved. The thyroid and other tissues were gradually dissected away from the tumor, which was found to be completely encapsulated, and to lie closely adherent to the trachea, the œsophagus, the recurrent laryngeal nerve, the jugular and innominate veins, and the innominate artery. About one hour was consumed in dissecting the tumor free from these structures,

after which the wound was partly closed; a large drain was left in the middle third, with the view of keeping the wound open and exposing the tracheal wall for subsequent X-ray treatment in case a histological examination revealed any signs of malignancy.

The patient's recovery was prompt, and, aside from a short period of iodoform poisoning, it was uneventful. Laryngoscopic examination showed a paralysis of the right vocal cord, but a great increase in the lumen of the trachea. The vocal paralysis was undoubtedly due to division of the recurrent laryngeal nerve. On examination, the tumor proved to be an adenoma, probably of an accessory thyroid, and it showed in places slight changes suggesting carcinomatous degeneration.

DR. F. Kammerer said that surgeons who had much experience with thyroid tumors could well appreciate the difficulties of an operation like the one described by Dr. Brewer, especially when hæmorrhage and dyspnæa were present at the same time, and the question arose which of the two to attend to first. The situation thus created was one of the most trying surgeons could meet with. Years ago, when the speaker saw cases more frequently, it was considered a very dangerous procedure to do a tracheotomy in connection with extirpation of the thyroid gland. The former should only be done when all other attempts to relieve dyspnæa had been exhausted. The large wound cavity was liable to be infected after opening the trachea, and therein lay the danger.

Dr. Kammerer said that as long as a malignant tumor of the thyroid did not perforate its capsule, the prognosis was relatively good. He recalled one such case, a large, encapsulated malignant tumor, in which the patient lived for a period of twelve years. When perforation and carcinomatous infiltration of surrounding tissues had occurred, the outlook was very unsatisfactory.

Dr. Francis J. Quinlan (by invitation) said that when the patient shown by Dr. Brewer first came under his observation, which was several weeks prior to the operation, he presented all the symptoms of one who was suffering from stenosis of the larynx or trachea. The laryngoscope revealed the cause of the dyspnæa. The trachea had the appearance of a funnel struck by a hammer. Although there was no reason to suspect syphilis, the patient was given a thorough course of specific treatment, without resulting benefit. Macroscopically, the tumor removed by Dr. Brewer looked like an enormous sarcoma.

Dr. Brewer said that while the supposition was that this was an adenoma of an accessory thyroid, it was evident that the thyroid was separate from this distinctly encapsulated tumor. It was easily peeled off and separated. Its lower part was fibrous in character. The speaker said his impression was that it was one of those thyroid masses which grew in the wall of the gland, and yet were distinct from the thyroid itself.

CALCULI IN THE COMMON DUCT; CHRONIC CHOLAN-GEITIS; CHOLECYSTECTOMY AND CHOLEDOCHOTOMY.

Dr. Charles H. Peck presented a man, aged fifty years, who was referred to him, March 22, 1904, by Dr. L. O. Monory. The man had been ill for about three years with pains in the upper abdomen, chills, fever, sweating, slight jaundice, and loss of flesh and strength. For a long time he had been under treatment in Philadelphia, where he had consulted a number of physicians, but obtained only temporary relief. He came to New York in November, 1903, and had been more or less constantly under treatment. While not confined to bed, he was too ill to attend to his work. The chills, fever, and attacks of pain occurred frequently, but without regularity; usually at intervals of from one to three days. The chills were often severe, lasting from twenty to thirty minutes. The pain was variable in character and duration, often lasting several hours. Icterus slight and variable.

While the patient was in Dr. Peck's office he was taken with a severe chill, which lasted about twenty minutes. His temperature immediately afterwards, taken in the mouth, was 102° F.; pulse, 112. On examination, there was an area of increased resistance in the region of the gall-bladder, but the mass could not be distinctly outlined. There was moderate tenderness and rigidity; otherwise, abdominal palpation was negative. Slight icterus. Leucocyte count, 17,000.

The patient was admitted to the French Hospital on March 29, 1904. He had had no chills during the preceding week, and the pain and tenderness have subsided considerably. Leucocyte count, 11,000. Operation, two days later, under ether anæsthesia. The region of the gall-bladder was exposed through a five-inch incision, vertical through the right rectus, then oblique towards xiphoid. The gall-bladder was buried in dense adhesions, small and thick-walled, firmly attached to the transverse colon. Chole-

cystectomy was done by the Lilienthal method, with a traction suture of chromic gut through the cystic duct, and a clamp above it at the base of the gall-bladder. A perforation on the under surface of the gall-bladder was exposed on separating it from the transverse colon, and a small quantity of bile escaped, the dense adhesions having prevented previous leakage. The viscus measured less than two inches in length; its walls were greatly thickened; its cavity much contracted. A small amount of thin pus was found in a closed pocket at the fundus.

The stump of the cystic duct was now drawn up by the traction suture, and a greatly dilated common duct exposed, in which a movable stone could be felt. With scissors, the stump of the cystic, common, and hepatic ducts were freely slit open; both the hepatic and common ducts were much dilated, readily admitting the forefinger. A large stone was felt high in the hepatic duct and removed with forceps; another was removed from the lower end of the common duct, where it had acted as a ball-valve. A probe was passed into the duodenum, and no other calculi were found. A small drainage tube was passed well into the hepatic duct and fastened in place by two fine, chromic gut sutures, placed laterally, as suggested by Mayo. A single chromic gut stitch was then taken in the common duct below the tube, and, after cleansing, three cigarette drains were placed in Morrison's space down to the duct. The abdominal wall, excepting at the point of drainage, was closed.

The patient reacted well from the operation, and his bowels moved in response to an enema at the end of forty-eight hours. Bile drained freely through the tube in the hepatic duct until the third day, when the tube was removed. Subsequent to this, bile escaped from the wound in constantly diminishing amount until the twenty-second day.

There was no recurrence of pain, chills, nor fever after the operation, and convalescence was uneventful, with the exception of a slight separation of the upper end of the wound, which was caused by the patient's getting out of bed about the sixth or seventh day. This caused some delay in the closure of the abdominal wound. The patient left the hospital on May 3 practically well.

Dr. Lilienthal thought the method followed by Dr. Peck was superior to that suggested by Mayo in a recent issue of the

New York Medical Record. In cholecystectomy by the latter method, the beginning was made in the cystic duct, and ligation was practised with the idea that there would be less hæmorrhage. The speaker said he did not think the hæmorrhage was apt to be severe; certainly not until the cystic duct was reached. What bleeding there was came from the liver. The disadvantage of the method was that one then had the cystic duct sealed, and if it became necessary to proceed with work on the common duct, another operation, choledochotomy, would have to be done.

Referring to the small size of the gall-bladder in Dr. Peck's case, Dr. Lilienthal said that the small gall-bladders were usually more difficult to take out than large ones.

DR. PECK, in closing, said that this was the first time he had attempted a cholecystectomy by this particular method. The hæmorrhage was easily controlled. The chief difficulty was in separating the adhesions from the transverse colon and liver. The hepatic and common ducts were so large that they could be easily followed, and with the finger the stone could be palpated. The readiness with which the widely opened hepatic and common ducts closed upon suture was particularly gratifying. The closure was continuous, and complete in about three weeks, although they had been laid widely open for a distance of over two inches.

NEPHRECTOMY FOR SARCOMA.

DR. CHARLES N. Down presented a girl, six years old, who was admitted to St. Mary's Hospital on March 28, 1904. Her family and previous personal history was unimportant, and the child was in good health until six months before her admission, when she began to have pain in the left hypogastrium and left lumbar region. She frequently felt nauseated. She first noticed a swelling in the left hypogastrium two months before admission. This had grown rapidly. She had lost much in weight and strength. Her urine had occasionally been dark-colored of late.

When the patient came to the hospital she was pale and emaciated. The heart and lungs were normal. The abdomen was greatly distended and the superficial veins much dilated. A tense, elastic, smooth tumor could be felt within the abdomen, extending from the diaphragm into the left part of the pelvis, pushing back into the lumbar region and across the median line in front for two or three inches. Its general outline was globular; it was

very slightly movable. The urine was of a specific gravity of 1028; acid; it contained no albumen, blood, casts, nor sugar. The leucocyte count was 13,000.

March 30, an oblique incision was made, beginning at the twelfth rib at the margin of the quadratus lumborum above the anterior superior iliac spine, and extending across to the median line below the umbilicus. The peritoneum was incised for about four inches. The tumor was only slightly adherent to the surrounding tissues, and was enucleated with little difficulty and very slight hæmorrhage. The ureter and renal vessels were ligated separately. The peritoneal wound was closed with catgut, the fascia with chromicized gut, and the skin with silkworm gut, with a small silkworm-gut drain. Convalescence was prompt and uneventful. There was a free secretion of urine, of good quality, from the start.

Pathologically, the tumor proved to be a sarcoma of the perithelial type, originating within the kidney capsule, probably from the outer coating of the blood-vessels. It seemed not to be of adrenal origin.

The pathological report by Dr. Frank S. Mathews was as follows: "The tumor lies beneath the kidney capsule, and between it and the kidney parenchyma. On section, the tumor is found to consist of cells, spindle or polyhedral, sometimes arranged in rows, with a small amount of stroma between them. The masses of tumor cells are arranged around a central blood-vessel. These vessels often have a wide lumen, and do not show the usual number of coats, but the tumor mass of cells seems to take the place of adventitia.

"The striking features of the tumor are its relation to the blood-vessels, and the rows of cells extending radially from the central blood-vessels. Sections at the junction of the tumor and renal parenchyma show the tubules and tufts compressed but not infiltrated with tumor tissue. In other places, the kidney tissue remains practically normal. The diagnosis is perithelioma, or perithelial sarcoma."

Dr. Dowd said the case illustrated the ease with which these sarcomata could sometimes be removed, even after attaining a large size. As bearing upon the prognosis and the ordinary operative mortality, the statistics collected by Dr. Waller, of Baltimore (Annals of Surgery, Vol. xxvi), were of interest. A careful

study of the recorded cases and a review of the histories of seventy-four operative cases showed that the operative mortality was 36.48 per cent. and the mortality within three years between 73 and 93 per cent. The percentage of cures followed beyond the three-year limit was 5.4 per cent. The life period was apparently increased 8.69 months by the operation.

DR. Kammerer said he was surprised to hear that Dr. Dowd had experienced so little difficulty in developing such a very large tumor. In a similar case which the speaker reported about five weeks ago, signs of a recurrence had already become apparent. In that instance, great difficulty was experienced in raising the tumor above the crest of the ileum with the patient in the lateral position. Out of six cases that had come under his observation, the speaker said he had succeeded in extirpating the tumor in three. The three in which he had been unsuccessful were his earlier cases, and he had perhaps been too timid in his attempts, on account of the size of the growths.

DR. LILIENTHAL asked Dr. Dowd whether he employed the Trendelenburg posture in operating on his case? In two cases that had come under his observation, he had been enabled to extirpate the growths without opening the peritoneum at all. In one of these the tumor was almost as large as the specimen shown by Dr. Dowd; in the other it was smaller. The Trendelenburg posture was employed in both instances, and seemed to facilitate the manipulations very much. The speaker recalled two cases of enormous sarcoma of the kidney that had been shown some years ago by Dr. Abbe, who emphasized the importance of this position in facilitating the work.

DR. KAMMERER said he thought the ideal posture in these operations was the lateral position. Personally, he would attack all these tumors from the retroperitoneum, opening the peritoneum, however, in order to assure himself as to the position of the ascending or descending colon. The colon was at times not recognizable to the touch, but when seen it could easily be stripped off to the inside of the growth.

DR. Down, in closing, said that he had considered the use of the Trendelenburg position in this case, but thought that it would not have been an advantage. No great difficulty was experienced in removing the growth. The peritoneum laid over it like a fold, and would have had to be incised, no matter what the posture was.

PLASTIC OPERATION FOR THE RESTORATION OF THE LOWER LIP.

Dr. F. Kammerer presented an old man, whose entire lower lip had been involved in an epitheliomatous growth. In order to remedy the defect left by its removal, a quadrangular flap was removed from the cheek, carried down, and sutured to the remnant of the lower lip. The cosmetic effect of the operation was excellent. Dr. Kammerer said he thought this method was preferable to that of carrying a flap up from the neck, as the latter did not possess the advantage of an internal mucous surface.

REMARKS ON POSTOPERATIVE INTESTINAL OBSTRUCTION, WITH A REPORT OF THREE CASES.

DR. CHARLES H. PECK read a paper with the above title, for which see page 510.

DR. JOHN F. ERDMANN said he had seen several cases of postoperative intestinal obstruction. Three years ago he was called upon to relieve this condition in a boy who had been operated on in Brooklyn eight months previously for a suppurative appendicitis. When Dr. Erdmann saw him, he was suffering from profound intestinal obstruction. This was found to be due to an adhesive band. The cause of the obstruction was relieved, but the patient died from shock.

Four years ago he operated on a boy at St. Mark's Hospital. The patient had been running a septic temperature for several weeks, and had a large tumor in the right iliac region. This proved to be an abscess. This was evacuated, leaving an immense cavity, which required prolonged packing. It finally healed, and the patient left the hospital, refusing to submit to any further operative interference for the purpose of removing the appendix, from which the abscess had probably originated. Several months later he had an attack of intestinal obstruction, and died without operation.

The question of postoperative intestinal obstruction, Dr. Erdmann said, seemed to him to be largely one of prophylaxis. A movement of the bowels should be insisted on within twenty-four hours after the operation, and during each succeeding twenty-four hours. No morphine should be given; if any opiate is needed for the pain, codeia would usually be found satisfactory. Personally,

the speaker said, he had never had a case of postoperative intestinal obstruction, excepting in the abscess case reported above.

Dr. Brewer said he thought these cases were comparatively common. He had certainly seen six or seven cases of postoperative intestinal obstruction, three within the past year. One of these followed general peritonitis after an operation on the gall-bladder; one resulted from an abscess of the appendix, and the third occurred in a woman who had had eleven laparotomies performed for various reasons, most of them for intestinal obstruction. In that case, Dr. Brewer's laparotomy was the sixth time the patient's abdomen had been opened for intestinal obstruction. The intestines were everywhere matted together, and there were a number of distinct angulations. She recovered from that operation, but a recurrence of the condition was looked for.

Dr. Lilienthal was also of the opinion that intestinal obstruction following intra-abdominal operations was unfortunately very common. He recalled one case where he had operated for a ruptured liver abscess. The man had general peritonitis, from which he recovered. A year later he had intestinal obstruction, for which he was operated on too late and died. In two other cases coming under his observation, the intestinal obstruction followed operations for acute appendicitis.

Dr. Lilienthal said he did not think it was always possible to prevent the formation of adhesions. Some persons seemed to have an idiosyncrasy in that direction, and became subject to permanent adhesions more readily than others. Women seemed to be more subject to them than men. He had seen cases of so-called clean appendicectomy followed by adhesions. The speaker said he thought Dr. Peck had done a valuable service in emphasizing the fact that all cases of laparotomy should be watched for several weeks subsequent to the operation, particularly in respect to diet and the action of the bowels. These factors were too often neglected.

DR. Down mentioned a case of intestinal obstruction in which he had assisted Dr. Henry C. Coe where the condition was the result of injections made by a quack for the cure of hernia. An enormous number of adhesions were found, producing tight occlusion of the intestine. The injections in that case must have been made into the peritoneal cavity.

Dr. Peck, in closing, said he particularly wished to empha-

size the importance of the after-treatment of laparotomy cases. If these patients were safely tided over the first six or eight weeks, the great majority of adhesions would have become absorbed by that time, and the danger of intestinal obstruction would be comparatively slight. As Dr. Lilienthal had suggested, some persons may be predisposed to the formation of permanent adhesions; but in the great majority of cases the obstruction occurred within the first two weeks, and many of them could probably have been prevented by proper attention to diet and the condition of the bowels.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, May 2, 1904.

The President, E. WYLLYS ANDREWS, M.D., in the Chair.

CARCINOMA OF THE CHEEK.

Dr. Nicholas Senn presented a patient upon whom he had recently operated for an extensive carcinoma involving the left cheek. When admitted, the left cheek was the seat of an extensive swelling, in the centre of which was a perforation which communicated with the cavity of the mouth. Sections of curetting under the microscope showed it to be a case of unusually malignant form of carcinoma that had its starting-point somewhere about the alveolar process on the left side and involved the entire cheek. There was extensive regional dissemination, although the disease had lasted only three or four months. The submaxillary lymphatic glands were involved. In the absence of glandular involvement along the sheaths of the vessels of the neck, a radical operation seemed justifiable. The entire cheek was removed, leaving the angle of the mouth and a small portion of the cutaneous covering of the cheek. The periosteal covering of the lower jaw on the corresponding side was sacrificed together with the submaxillary gland and the whole chain of lymphatics. An enormous defect remained, which required a very extensive plastic operation to cover in. Owing to quite an extensive alopecia behind the frontal region, it was possible to utilize in this case a temporofrontal flap. A large flap was raised from the left temporal region, extending over to the frontal, and turned down and sutured into the wound, so that this lining of skin was a substitute for the lost mucosa of the cheek. A flap from the skin

of the neck was then formed and drawn up so as to cover the raw surface exposed. For the purpose of supplying this enormous flap with additional blood supply a flap from the scalp was laid over the base of the pedicle and another one from behind. The scalp defects were filled in at once with Thiersch's skin grafts. The circulation of the inner flap was satisfactory, and the large wound healed almost throughout by primary intention.

MULTIPLE TUBERCULAR ABSCESSES.

Dr. Senn presented a man, forty-five years of age, who had been admitted to the Presbyterian Hospital with three large tubercular abscesses involving the left side of the chest. One of these ruptured spontaneously, and a fistulous opening communicated near the nipple, with a very large abscess cavity. Another abscess was found at the junction of the ribs with the cartilage near the sternum, and another to the left of the mammary line-three large, distinct tubercular abscesses, with no anatomical connection, as shown by the peroxide of hydrogen test. At operation the third, fourth, and fifth ribs were found to be the seat of tuberculosis. The reporter was obliged to resect the ribs in their entirety, a rule in practice to which there should be no exception, because tuberculosis of the ribs invariably means an antecedent tubercular perichondritis or a tubercular periostitis. Therefore, the tubercular product surrounding the ribs or perichondrium makes it necessary to use Koenig's incision, and to always resort to the resection of the rib in its entirety to reach the floor of the abscess, in order to follow the fistulous tracts which may communicate with other secondary tubercular foci.

In this extensive resection all of the large abscess cavities were scraped out and vigorously disinfected with peroxide of hydrogen, followed by a 3 per cent. solution of carbolic acid, and finally a 1 per cent. solution of iodine. Extensive primary drainage was instituted and continued for two or three days. Then the multiple wounds were sutured throughout, and ten days later all of these wounds had healed by primary intention.

ACUTE OSTEOMYELITIS.

Dr. Senn presented a youth in whom a primary osteomyelitic focus had involved the internal tuberosity of the tibia. Although the disease was limited, the general symptoms were very

marked, all out of proportion to the size of the osteomyelitic focus. There was no tendency of the disease to extend to the shaft of the bone, but at a comparatively early stage, owing to the proximity of the osteomyelitic focus to the knee-joint, secondary synovitis set in, which unquestionably added to the acuity and intensity of the disease. A copious effusion formed, but after the removal of the osteomyelitic focus by early operative intervention, the synovitis soon subsided; the general symptoms became more mild, but in the course of a few weeks the patient complained of pain in the left elbow. The external condyle of the humerus was the seat of a secondary osteomyelitic process. The disease in the humerus pursued a very mild course. No swelling of any size made its appearance. Tenderness, however, remained for a number of weeks. He exposed this secondary osteomyelitic focus, relying almost entirely upon the point of tenderness, by a curved incision, with its convexity directed downward, reflected the flap up to near the joint, and with chisel and hammer found a deepseated abscess in the bone. He scraped out this osteomyelitic cavity, resorted to thorough disinfection by pouring into it, first, peroxide of hydrogen, and afterwards using a 5 per cent. carbolic acid, dried the cavity, and packed it with decalcified bone chips, and obtained healing through by primary intention.

After having been absent from the hospital for a number of

After having been absent from the hospital for a number of weeks, the patient presented himself again with a central osteomyelitis of the inferior maxilla.

CYSTS OF THE DUCTUS THYROGLOSSUS.

DR. SENN said that he had had to deal with three cases of cysts of the ductus thyroglossus in two weeks. The patients were all young subjects, eighteen to twenty-five years of age,—two females and one male. The cysts were comparatively small. They were located in the median line, between the thyroid cartilage and the base of the hyoid bone. The enlargement was slow; there were pain and swelling. The skin was movable in all of the cases over the surface of the swelling. Fluctuation was distinct. In all of them the cysts contained a white viscid substance, a little thicker in consistence than synovial fluid. The only operative procedure which promises a satisfactory result is excision. The slightest remnant of the epithelial lining remaining will invariably

give rise to prompt recurrence, so that excision must be practised with the utmost care. He succeeded in these cases in excising the cysts. In one the wall was thin, and he had to remove remnants of the cyst wall after he had removed the bulk of the swelling.

FIBROMA OF THE PERIOSTEUM.

DR. Senn presented a specimen of fibroma of the periosteum which had its starting-point from the periosteum of the second rib close to the cartilage. The tumor extended over the surrounding bony framework in mushroom-like manner and underneath the clavicle. The clinical history was somewhat obscure. The patient had a doubtful past. Very vigorous antisyphilitic treatment was at first resorted to without making any impression upon the size of the tumor or relieving the pain accompanying it. It was finally removed through a curved incision, with its convexity directed upward, and the flap reflected as far as the clavicle, thus laying bare freely the base of the tumor, which was found intimately attached to the periosteum of the second rib near the sternum. The tumor was very firm and smooth, and on making a section it cut almost like cartilage.

A second fibroma of the ribs, situated at the lower part of the scapula, he had removed recently from a woman, thirty years of age, who stated that she first noticed the tumor eighteen years ago. It was stationary for awhile, but gave rise to quite serious functional disturbance by fixation of the arm. On examination a tumor was found extending in the direction of the axillary space. He had great difficulty in laying this tumor bare. The surrounding muscles seemed to be implicated in the surface of the tumor. There was no encapsulation. Dull instruments were useless. By tedious dissection he laid the scapula bare up to near the neck, and then removed it with chain-saw.

VERRUCA SENILIS.

Dr. Senn presented specimens removed from the face of a woman, seventy-one years of age, the subject of multiple senile warts or verruca senilis. The disease involved the malar eminence on both sides. There were a number of these warts scattered all over the face; those over the malar eminence were the seat of repeated irritations, and had undergone transformation

into epithelioma. Both of them had their starting-point in a pre-existing senile wart or verruca senilis.

GOUT SIMULATING MYOSITIS OSSIFICANS.

Dr. Senn presented a colleague upon whom he had operated twice before, once for a diffuse septic inflammation involving the right arm and forearm, and a second time for appendicitis. For a number of months he had complained of a vague pain in the right shoulder. He regarded it as a rheumatic affection; but local and general treatment failed to give him any relief. The pain increased in severity, and the shoulder-joint almost completely lost its function. An X-ray photograph revealed no indication of any swelling, but Dr. Senn found at a point corresponding to about the middle of the base of the deltoid there was a limited area of tenderness. On examining the photograph there can be seen at the centre of the deltoid muscle a dark elongated spot. The shoulder-joint itself is normal. The reporter considered the case on the face of this photograph one of myositis ossificans. The dark island representing bone tissue in the deltoid as it appears entirely separate from the greater tuberosity of the humerus. Acting upon this diagnosis, he laid the deltoid muscle bare by a curved incision, reflected the flap upward, and found, to his utter astonishment, the deltoid absolutely normal. In palpating the deltoid, he found at a point corresponding to the outer side of the bicipital groove of the greater tuberosity a rather hard swelling; he separated the deltoid vertically by the use of the director and came down to a hard mass, not bone, but underneath the periosteum it appeared to be encapsulated. incised and exposed a large mass of inorganic salt, sodium biurate. He scraped this out, and, to be sure he should make no mistake by leaving an undiscovered bone lesion, he chiselled away a little of the surface of the bone, which he found extremely dense. process of condensation had taken place; the surface of the bone became compact at a point corresponding to this inorganic deposit. The diagnosis of gout now was plain.

LIPOMA ARBORESCENS OF THE KNEE.

Dr. Senn said that in the last four weeks he had had two cases of lipoma arborescens. In one case the patient was a young

man, college student, about nineteen years of age, athlete, who had recently become incapacitated because of a weak knee-joint. Dr. Senn made externally a long incision, explored the joint, and found the synovial membrane preternaturally vascular, but had considerable difficulty in locating the mechanical cause of this temporary loss of function of the joint. Finally, in examining closely the lower recess of the synovial sac corresponding to the space between the tuberosity of the tibia and the patella, an unusual prominence, so that by a certain movement of the joint the swelling would insert itself between the two articular surfaces, he uncovered that part of the synovial sac and found underneath it a very diffuse lipoma. The capsule was sutured to the external wound and the joint immobilized. Healing throughout by primary intention followed, with satisfactory restoration of the function of the joint.

The second case was a more pronounced one. The patient was a young girl suffering from the same symptoms, with temporary derangement of the joint in walking, so as to make the knee-joint partially useless. There was found a typical lipoma arborescens involving the opposite side of the synovial sac, implicating the patella, and extending up to the upper recess. There was a large, diffuse intra-articular lipoma. The entire synovial surface was very vascular, thickened, and it looked like a typical case of tuberculosis, of course. But strangely, in both of the cases there was no hydrops. Here he resected the entire synovial sac, treated the wound in a similar manner as in the first case, and the patient is recovering very rapidly.

THE UNION OF UNUNITED FRACTURES OF THE NECK OF THE FEMUR BY OPEN OPERATION.

Dr. Leonard Freeman, of Denver, Colorado, read a paper (by invitation) with the above title, for which see page 561.

Dr. Nicholas Senn said that the question of direct fixation of such fractures was not a new one. In the years 1882–83 he spent what little leisure time he had in a scientific study of the question. It was up to that time doubted whether union by bone under any circumstances could be obtained in cases of intracapsular fracture of the neck of the femur, and he presumed this was the anatomical seat (intracapsular) in Dr. Freeman's case. He produced this

fracture on the lower animals by drilling the neck of the femur in different directions and fracturing it, satisfying himself in each instance that he had not only produced a fracture, but it was inside the capsule. He treated twenty-three of the animals thus experimented upon by the methods of treatment then in vogue. He entertained the hope he would be able to prove that that method of treatment would succeed in obtaining bony union in cases in which the line of fracture was within the capsule of the joint. In all of these twenty-three cases he failed. He nearly despaired that he would be able to prove his position assumed at that time, that bony union was possible, and hence he had to resort to direct methods of fixation. Breaking the bone in a similar manner, he resorted to the use of ivory bone pegs and metallic nails. In ten experiments following twenty-three failures, in nearly all of them he could demonstrate that he had obtained bony union. He found, however, afterwards practically that the same results in the human subject were obtainable by indirect methods of fixation by bringing the fractured surfaces in contact and holding them there by lateral pressure by a splint of his own device. He had treated since that time fifteen or twenty cases, and in the majority of them he could demonstrate not only excellent functional results, but union by bony consolidation.

Dr. Senn said that, judging from the osteoporotic neck of the trochanter in Dr. Freeman's case, and the amount of shortening in the case, as well as the incomplete functional repair, he seriously doubted whether the bone had united by consolidation. It was always a question whether the method of fixation had anything to do in effecting such an ideal result. He doubted whether an ivory bone-nail, or any kind of nail, in such osteoporotic bone would hold the fragments in apposition. not think extension by weight and pulley could add anything to the functional result, because in aiming at bony union in cases of this kind it became absolutely essential to resort to immediate reduction at once and hold the fractured surfaces in mutual uninterrupted contact, something that could not be accomplished by extension with weight and pulley. He should imagine, as an additional mechanical aid, it would be preferable in cases of this kind not to rely on nailing the fragments, but to combine it with immediate fixation with a well-fitting plastic splint, with the limb slightly abducted, securing for the seat of fracture the necessary

degree of rest. He was sure a number of such operations had been performed, but the results had not been published because they were disastrous. It was necessary, in operating in such an important locality as the hip-joint, to see to it that, if it became necessary to vivify the fractured surfaces through an anterior incision to bring the parts in such a condition, the surgeon could close the wound throughout and obtain healing by primary intention without the dangers incident to drainage. The surgeon must be conservative in interfering with old fractures of the neck of the femur, because in some cases of non-union the functional results were excellent. It became a serious responsibility when one converted a subcutaneous fracture of the neck of the femur into an open wound, because surgeons had not reached that certainty in asepsis which entitled them to do so without making a very careful selection of cases. He questioned very much whether at present surgeons were warranted in resorting to the open treatment.

Dr. A. J. Ochsner referred to a paper read by Dr. Ruth before the American Medical Association in June, 1901. At that time Ruth showed a femur which had been removed from a patient who had been treated some years before. The specimen which Ruth showed seemed so satisfactory that some of the critics believed that the bone had not been fractured because it had united so well. However, Ruth gave measurements before and after the fracture, and to the speaker's mind the line of union was plain. He had followed the method described by Ruth after returning home, and had since used it in sixteen cases. The ages of these patients were 30, 37, 37, 43, 47, 53, 54, 57, 58, 60, 62, 66, 76, 78, 79, and 80. Two of them died, one of diabetic coma and the other one of exhaustion. There was union in all of them. The amount of shortening in all of them was less than three centimetres, which corresponded to the results obtained by Dr. Ruth and the observations he had made in a number of cases.

The principle upon which Ruth's treatment was based had been published and illustrated fully in the Journal of the American Medical Association, so that it was not necessary for him to describe it. He depended upon extension which was longitudinal, downward, and extension upward and externally, so as to produce internal rotation of the entire extremity and to elevate the great trochanter and overcome the external rotators. In all of the

cases the patient was anæsthetized upon admission to the hospital in order to confirm the diagnosis without giving too much pain. The extremity was placed in the corrected position; measurements were made before and after anæsthesia, and before and after the correction. The extremity was placed in the corrected position, and then the rubber adhesive plaster applied as directed by Ruth. This method was first introduced many years ago by Dr. Maxwell, of Keokuk, a colleague of Dr. Ruth's. Extension was applied downward; then a second broad rubber adhesive plaster was applied from a point on the anterior inner surface as high up as possible around the posterior surface of the thigh and out; and the speaker made use of a little device which consisted of adjustable posts made for weight and pulley extension, applied to the side as well as to the foot of the bed. He had found this very convenient. One of these frames was placed opposite the greater trochanter a little above it, and a weight varying from four to twelve pounds was attached to this pulley, which caused internal rotation, and another weight of eight to twenty-four pounds was attached to a second pulley at the foot of the bed, causing extension.

One of the beneficial results of the treatment was, that whereas formerly, when extension was made in a longitudinal direction, and a posterior or lateral splint applied, there was pain always, with this method but one of the sixteen patients had complained of severe pain, and this patient was so very hysterical that it was doubtful whether she had pain or not. It seems as though the use of this method would greatly reduce the number of ununited fractures of the hip.

Personally, he had made the open operation but once in a case in which the patient had a very painful hip, with ununited fracture. In this case he used two Parkhill screws through the neck and into the head; but the result was not satisfactory, and he had to remove the head afterwards. Union was primary, but there was so much callus as to cause pain. Possibly the traumatism was too great, due to the use of two screws.

Dr. Alexander Hugh Ferguson said he had had three cases of ununited fractures of the neck of the femur upon which he had operated.

The first was a man, fifty years of age, and the fracture was of three years' standing. Operation was done on account of pain

and lack of function. Patient was not able to do his work as a farmer. The head of the bone was removed through a lateral incision. Result was excellent. Patient was now able to work. There were nearly two inches of shortening.

The second case was a woman, with fracture of two years' standing. She was sixty years of age, and fractured her hip while riding a bicycle, having fallen upon the hard pavement. Operation was undertaken on account of inability to use the limb and pain. He removed the head of the bone, and obtained good functional result, with shortening of about an inch and a half. She was again able to ride a bicycle. He was surprised in this case at the soundness of the head of the bone. It was firm and hard. He felt sure that if he had brad-holed the seat of fracture and put an ivory peg through and fixed it with plaster of Paris, or something else, he would have gotten bony union.

The third case was a woman, twenty-six years of age, who was at present in the hospital, but about ready to leave. She was able to rest the leg on a chair and had good function in seven weeks. He removed the head of the bone on account of ankylosis of its head in the acetabulum. There was also a fracture of the head of the bone towards the acetabulum, which caused firm ankylosis at the acetabulum, and he thought, if he had fixed the neck with the rest of the bone, there would still be ankylosis.

His experience in these three cases had induced him to favor the open operation. His experience with non-union in other bones, where the surgeon brad-holed and opened down into them, wired the fragments, and put all sorts of rings or clamps around them, was that union did not take place even then, and the surgeon had to resort to the open method, put in live bone chips, or pack it with iodoform gauze, leave the cavity open, and let it heal from the bottom, and thus obtain firm bony union. He mentioned a case of fracture of the radius which he had last year, in which he resorted to the open method successfully. Other surgeons had used this method with success. He did not see why surgeons could not pursue the open method in connection with fractures of the neck of the femur in selected cases.

Dr. Freeman agreed with Drs. Senn and Ochsner that in recent fractures of the neck of the femur the open operation should be avoided; but in those fractures which were ununited, if one wished to get union, it was necessary to resort to the open

method. He did not think there was as much danger attending the open operation as Dr. Senn had intimated. Surgeons should use those measures which they thought under the circumstances would give the best results; whether it be the removal of the head of the bone, as suggested by Dr. Ferguson; whether the use of pegs of various kinds or wiring, or some such apparatus as Dr. Senn had used so successfully in recent fractures of the neck of the femur. There was not as much danger from the use of screws as Dr. Senn had led us to believe. Dr. Parkhill had used his clamp in fifteen or twenty ununited fractures of various kinds without bad results. Those who had employed the boneclamp had observed that if infection did take place after its use, which was seldom, it did not occur for many days after operation had been done. The infection, if it occurred, would creep down slowly from the skin along the track of the screw, and by this time the hip-joint itself would be walled off from the screw track altogether by new tissue, lymph, etc. Hence infection would be along the screw into the cancellous tissue alone, as in his own case and that of Dr. Davis. He believed the stimulation of the screw through the bone was a great incentive to bony union. He thought Parkhill had fully proven in his reported cases in the Annals of Surgery that when reparative action failed by ordinary measures (wiring, etc.), that union was obtained at once by the use of his clamp. In no single instance did Parkhill fail with his clamp, nor has any one else to his knowledge who had used it.

CORRESPONDENCE.

ON THE VALUE OF POSTOPERATIVE GASTRIC LAVAGE. EDITOR Annals of Surgery.

There are, to my mind, two valuable results to be obtained by the use of postoperative gastric lavage—(1) vomiting is prevented in a large percentage of cases, as pointed out by Dr. C. S. White in his article in the August number of the Annals of Surgery; and (2) the kidneys are relieved of the necessity of eliminating variable quantities of a substance capable of producing serious and even fatal inflammatory lesions. This latter point has not been brought out by Dr. White, and is, I believe, the more important of the two.

After operation, the excretory function of the renal apparatus should be at its maximum in order that the toxic products resulting (a) from unavoidable infection during operation and (b) from disease may be promptly eliminated. The smallest possible quantity of anæsthetic has been insisted upon by Simpson of this city with this idea in view. If, in addition, a portion of the ether it has been necessary to use can be removed from the body by washing the ether-laden mucus from the stomach, the tax upon the kidneys is still further diminished.

I have been using gastric lavage at the East End Hospital as a routine procedure after operation since October, 1902, and am convinced of its value. It is my intention to have made a stomach-tube with a diameter of seven or eight millimetres in order that it may be introduced through the nares instead of through the mouth, thus avoiding the use of the mouth-gag. The ordinary stomach-tube, however, is a necessity in cases in which there is doubt as to the presence or absence of solid food in the stomach.

JOHN D. SINGLEY.

212 NORTH HIGHLAND AVE., PITTSBURG, PA.

LISTERINE

A non-toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution, sightly, pleasant, and sufficiently powerful for all purposes of asepsis. These are advantages which Listerine embodies.

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine.

LISTERINE DERMATIC SOAP

(For use in the Antiseptic Treatment of Diseases of the Skin)

Listerine "Dermatic" Soap contains the essential antiseptic constituents of thyme, eucalyptus, mentha and gaultheria, which enter into the composition of Listerine. The quality of excellence of the soap-stock which serves as the vehicle for this medication, will be readily apparent when used upon the most delicate skin, and upon the scalp.

Listerine "Dermatic" Soap contains no animal fats, and none but the very best vegetable oils enter into its composition; in its preparation unusual care is exercised, and as the antiseptic constituents of Listerine are incorporated with the Soap after it has received its surplus of unsaponified emollient oil, they retain their peculiar antiseptic virtues and fragrance.

A Sample of Listerine Dermatic Scap may be had upon application to the Manufacturers—

LAMBERT PHARMACAL CO., St. Louis, U. S. A.

Be assured of genuine Listerine by purchasing an original package

i,

DLIVE LATHAM

A STORY OF RUSSIA

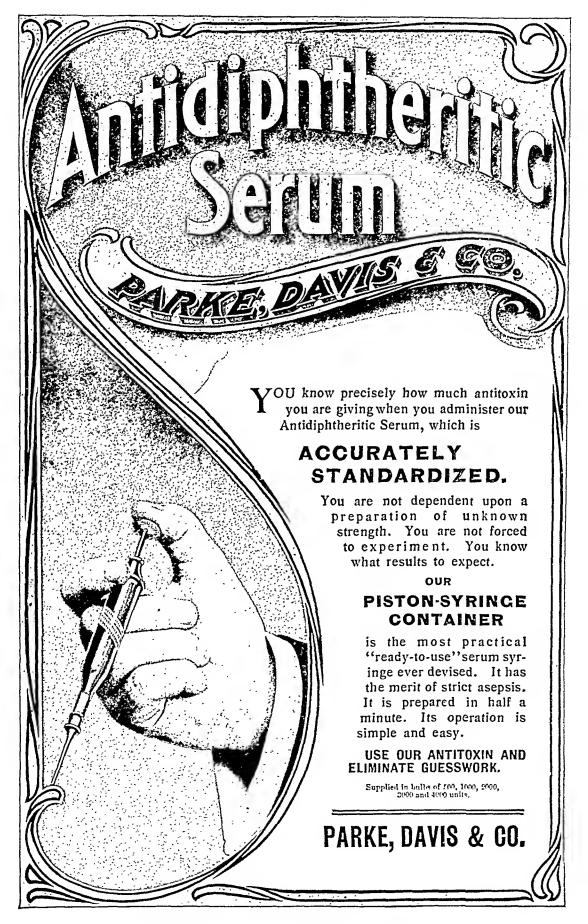
By E. L. VOYNICH, author of "Jack Raymond," "The Gadfly"



Publishers

J. B. LIPPINCOTT COMPANY

Philadelphia



Surgical Anatomy

A TREATISE ON HUMAN ANATOMY IN ITS APPLICATION TO THE PRACTICE OF MEDICINE AND SURGERY

By JOHN B. DEAVER, M.D.,

Surgeon-in-Chief to the German Hospital, Philadelphia, etc.

In printing all the copies of *Deaver's Surgical Anatomy* so far demanded by its most successful sale, there will have been used 2,340 pounds of ink, 188,002 pounds, or 84 tons, of paper, and the printing press will have made 3,455,000 impressions, a form of 16 pages being printed at each impression.

Five artists were at different times employed in drawing the illustrations, though never more than three men were employed on it at one time. Had the combined work of the five artists been assigned to one man, it would have taken him 752 1/3 weeks, or 14 1/2 years, to complete his task.

Synopsis of Contents:

VOLUME I.— Upper Extremity—Back of Neck, Shoulder and Trunk—Cranium—Scalp— Face. 632 pages; 151 Plates.

VOLUME 11.—Neck—Mouth, Pharynx, Larynx, Nose—Orbit—Eyeball—Organ of Hearing—Brain—Female Perineum—Male Perineum. 709 pages; 170 Plates.

VOLUME III.—Abdominal Wall—Abdominal Cavity—Pelvic Cavity—Chest—Lower Extremity. 816 pages; 178 Plates.

Three Royal Octavo Volumes of Two Thousand, One Hundred and Fifty-Seven Pages, containing Four Hundred and Ninety-nine Fullpage Plates engraved from original drawings made by special artists from dissections prepared for the purpose.

Synopsis of Illustrations:

VOLUME I
,
UPPER EXTREMITY 95 Plates
BACK OF NECK, SHOULDER AND TRUNK
CRANIUM—SCALP—FACE 32 " 151
VOLUME II
NECK 47 Plates
MOUTH 3 "
PHARYNX 6 "
LARYNX 10 "
NOSE
Orbit
EYE 14
EAR 12
DRAIN 32
JOINTS OF FIEAD AND NECK 4
MALE PERINEUM
— 170
VOLUME III
ABDOMEN 74 Plates
PELVIS
CHEST
LOWER EXTREMITY 56 "
- 178
TOTAL

"The work will prove of value not only to the student, but to the general practitioner and the surgeon."—Annals of Surgery.

Three Royal Octavo Volumes. Sold by Subscription, in Complete Sets Only.
Full Sheep or Half Dark-Green Morocco, Marbled Edges, \$30.00;
Half Russia, Gilt, Marbled Edges, \$33.00, net.

DESCRIPTION FREE UPON REQUEST TO THE PUBLISHERS

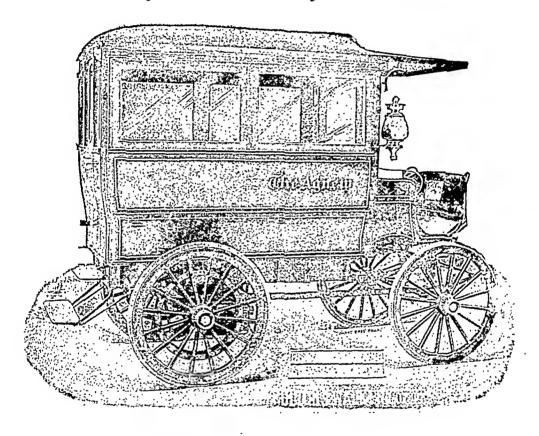
P. BLAKISTON'S SON & CO., Philadelphia

The cheapest is not always the Best, but the Best is always the cheapest

THE "NEW AGNEW"

Coach-Ambulance

This Sanitarium Vehicle is unexcelled for Convenience, Comfort, and Durability. A Perfect Coach. A Perfect Ambulance.



Contains best of all modern equipments. This is made either as a horse drawn vehicle or an Electric Automobile. . . Our price is reasonable. Ask for it.

FULTON & WALKER COMPANY,

20th and Filbert Sts., PHILADELPHIA.

We wish to call your attention to our exhibition of ambulances now at St. Louis, located in the Transportation Building.

REDUCED TO THREE DOLLARS A YEAR.

JOURNAL OF THE Association of Military Surgeons of the United States.

The only Journal devoted to the Military Aspects of Medicine, Surgery and Hygiene in the United States.

Announcement.

Original Articles.

The Journal will, in each number, continue the publication of original papers of the high order which has hitherto characterized the work of the Association. Arrangements have been made for important memoirs relative to the medico-military conduct of campaigns in all lands and by all nations.

Reprints and Translations.

The medico-military literature of other countries will be freely laid under contribution, and all important articles in contemporary literature will be drawn upon.

Medico-Military Index.

All articles in current literature pertaining to military medicine, surgery and hygiene, not republished will be promptly reported.

Editorial Department.

An accompilshed corps of collaborators will cooperate with the editor in presenting timely discussions, reviews, comments, and general information relative to current events of medico-military interest.

Typography and Illustration.

The Journal will continue to be printed in the best style upon heavy supercalendared paper and fine lliustrations will continue to be freely employed whenever possible to elucidate the text by their use.

Subscription, Three Dollars a Year in Advance.

Free to members of the Association of Military Surgeons of the United States

Association of Military Surgeons,

Carlisle, = = Pennsylvania.

REDUCED TO THREE DOLLARS A YEAR.



The Nursing Mother

Requires highly nutritious and readily assimilated food. The regular use of

Pabst Extract

assures an abundant supply of milk of a good quality.

A glassful four times daily assists nature, and is of decided benefit to mother and child.

It is rich in proteids, phosphates, and digestion ferments of malt, contains a proper amount of carbohydrates, and is acceptable to the taste.

Pabst Extract Laboratory
Milwaukee, Wisconsin.

Antiseptic, Anaesthetic, Germicide, Deodorant

Clean, Powerful, Efficient, Perfectly Safe.



NDED BY HIGHEST AUTHORITIES

As being unequaled when used for a

POULTICE, COMPRESS, DOUCHE IRRIGATION

Reduces Inflammation, Relieves Pain and Irritation, Checks Chronic Suppuration.
Assists the Kidneys in Eliminating the Poisonous Products of Metabolism by Cleansing the Pores of all Sebaceous Matter.

It Destroys all Offensive Odors and is Extensively Used in Preparing for Operation.

SULPHO-NAPTHOL SOAP A Superior Soap for Cutaneous Disorders Sample Sulpho-Napthol and Literature sent on application

THE SULPHO-NAPTHOL CO., HAYMARKET SQUARE, BOSTON, MASS.

NATIONAL LINES OF

MEXICO

National Railroad Company of Mexico Mexican International Railroad Interoceanic Railway of Mexico

3300 Miles Under One Management

THREE ROUTES TO MEXICO

Laredo-Eagle Pass-Veracruz

For Time Tables, Rates, and other information, address:

W. F. PATON, G. R. HACKLEY,

Gen'i Western Agt., Gen'l Eastern Agt., 11 Broadway, 230-235 Quincy Bldg., Cor. Clark and Adams Sts., New York, N. Y.

Chicago, Ill.



"Colorado Short Line," ...DIRECT TO ...

Glenwood Springs, Colorado

AND ALL THE

Famous Resorts & Rockies.

Elegant Puliman Sleeping Cars, Observation Parior Cafe Dining Cars, with Electric Lights and Pans, and Free Reciining Chair Cars.

W. E. HOYT, G. E. P. Agt., 335 Broadway, N.Y.

Fall Fevers

are prevalent. For disinfecting the discharges, deodorizing and refreshing the sick room, "Platt's Chlorides" is recommended by many Sanitarians of national renown. Among whom are:

DR. THOMAS DARLINGTON, President New York Board of Health. PROF. J. A. McCORKLE, Advisory Member N. Y. Board of Health. DR. BENJAMIN LEE, Secretary Pennsylvania State Board of Health. DR. SAMUEL H. DURGIN, Health Physician, Boston, Mass. PROF. WM. E. QUINE, Ex-Pres. Ill. State Board of Health. DR. HEMAN SPALDING, Chief Health Inspector, Chicago, Ill. DR. GEO. K. PRATT, Mem. Louisiana State Board of Health. PROF. H. S. ORME, Ex-Pres. California State Board of Health.

For disinfecting discharges dilute with 4 parts water. For sprinkling floors, etc., "10 ""For moistening cloths, etc., "10 ""

"Platt's Chlorides" is an odorless, colorless liquid; powerful, safe, and economical; sold, in quart bottles only, by druggists everywhere.

Manufactured by Henry B. Platt at New York and Montreal.



ANTISEPTIC ANESTHETIC ANTIPHLOGISTIC

Unique in its properties and in the extent of its application. It is a local anesthetic which saturates and antisepticizes the tissues without injury. It removes pain, subdues inflammation, and absorbs suppuration.

PYROLIGNEINE

In surgery it replaces iodoform and bi-chloride, affording certain advantages all surgeons will appreciate. The clinical reports sent with samples give practical information as to the extent of its application.

Drop us a card NOW for samples and literature.

SAMPLES
FREE

THE PYROLIGNEINE CO., Winchester, Tenn.

BOOKS

CATTELL—Post-Mortem Pathology

In Press

The hit of the year in medical publishing. First large edition entirely exhausted. Second revised enlarged edition, with colored illustrations, almost ready. Over 300 pages. Over 200 illustrations. Cloth, \$3.00.

WHITE and MARTIN—Genito-Urinary and Venereal Diseases

Sixth revised edition of this celebrated text-book will be ready in the early fall. About 1100 pages. 250 text illustrations, many in colors. Cloth, \$6.00. In Press

BARKER—Anatomy

REPERT OF A STATE OF A

Ready Shortly

A Laboratory Manual of Human Anatomy, by L. F. Barker, Head of the Department of Anatomy, University of Chicago and Rush Medical College. Of about 600 pages, beautifully illustrated in colors and black and white.

GARRIGUES—Gynecology

In Press

An entirely new and practical book of about 500 pages. Fully illustrated. Especially designed for general practitioners and students.

PATON—Psychiatry

In Press

A text-book for students and physicians of about 500 pages, by Stewart Paton, of Johns Hopkins University. Illustrated, practical, and authoritative.

LIPPINCOTT'S MEDICAL DICTIONARY

A revised edition of this celebrated, authoritative, illustrated Medical Dictionary; to be ready in the early fall. About 1200 pages.

IACKSON—Orthodontia

In Press

This text-book on Orthodontia and Orthopædia of the Face, by Victor Hugo Jackson, of the University of Buffalo, is the most profusely illustrated work ever issued on the subject. It will be about 600 pages; contains 775 original illustrations. It is a practical work, and should be in the library of every dentist.

ROTCH—Pediatrics

Fourth Edition

Octavo. 1,021 pages. 62 colored figures. 528 textillustrations. Cloth, \$6.00. Fourth revised and enlarged edition.

GIBSON—Practice of Medicine

1770 pages. 122 illustrations. Cloth, \$8.00.

OPPENHEIM—Diseases of the Nervous System

Second Edition

953 pages. 343 illustrations. Cloth, \$5.00. Second revised edition.

Third Edition

WHARTON and CURTIS—Practice of Surgery 1241 pages. 823 illustrations, 18 in colors. Cloth, \$6.50. Third edition.

CUNNINGHAM—Manual of Practical Anatomy

Third Edition

1212 pages. 430 illustrations, 130 in colors. \$5.00. Third edition.

GARRIGUES—Obstetrics

750 pages. 504 illustratious, many in colors. Cloth, \$5.00; sheep, \$6.00.

Annals

Write for Free Illustrated Descriptive Catalogue

J. B.

LIPPINCOTT CO.

Kindly mail me your Illustrated Portrait Medical Catalogue and Descriptive Circulars.

J. B. LIPPINCOTT COMPANY

> PHILADELPHIA since 1792 LONDON since 1872

Name

Address

JUST PUBLISHED

M

A Treatise on Applied Anatomy

By EDWARD H. TAYLOR, M.D.

Illustrated with 178 figures and plates, from original drawings, many printed in colors. Octavo.

Cloth, \$9.00

For the

TUDENT URGEON PECIALIST

Cut out this slip and send to our Medical Department

Annals

J. B. LIPPINCOTT
COMPANY

J. B. Lippincott Co.

1

Kindly mail me your
Illustrated Portrait Medical
Catalogue and particulars about

Taylor's Anatomy.

PUBLISHERS

Name

PHILADELPHIA

Address

FERTILE VALLEY OF THE MISSISSIPPI.

While it is true Oklahoma, Indian Territory, and Texas invite the homesceker and others in search of a profitable livestment and business competency, there is another field along the Frisco System quite recently opened to those interested in a personal butterness of Sangalous seasons. betterment of financial resources

recently opened to those interested in a personal betterment of financial resources

On June 1st, the line of railroad heretofore known as the St. Louis, Memphis & South-eastern (now Friseo System), was extended to St. Louis, thus making a territory in Missouri and Arkansas, along the west bank of the Mississippi River, accessible by way of St. Louis.

The present service cousists of passenger train leaving Union Station 7.10 a.m. daily, for Cape Girardeau, Luxora, Carruthersville and intermediate points to Memphis, also the Cape Girardeau accommodation (daily), leaving Union Station 4.20 p.m.

Some years since, perhaps a quarter of a century, this section was avoided by reason of want of development or progressiveness; now, however, it is considered equal, as the homesecker and investor may measure, to Oklahoma, Iudian Territory or Texas. The change in condition throughout was accomplished by large governmental expenditure, a progressive people and extended railroad facilities promoted and maintained by the Frisco System, operating, as it does, nearly 700 miles of railway in the immediate Mississippl Valley, less than 300 miles distant from St. Louis.

The soll is expeedingly fortile crops invariably. distant from St. Louis

The soil is execedingly fertile, crops invariably abundant, timber interests extensive and resourceful.

Those desiring additional particulars will receive

immediate response. Address

Passenger Traffie Department, FRISCO SYSTEM, SAINT LOUIS.

LOW RATES TO CALIFORNIA, ARIZONA, MEXICO AND OTHER WESTERN POINTS.

Any one desiring to make a trip to California, Arizona, Mexico or other Western points, either for business or pleasure, can do so now at a small cost.

Commencing September 14th, and daily thereafter until October 14th, 1904, inclusive, special one way Colonist Tickets will be sold via the Southern Railway at rate of \$49.75 from Philadelphia to Los Angeles and San Francisco, Cal., and other Western points; corresponding low rates from other points.

The Southern Railway operates through personally-conducted Excursion Sleepers from Washington to Los Angeles and San Francisco without change, via Atlanta, New Orleans and El Paso; leaving Washington at 9 P. M., every Monday, Wednesday and Friday. The berth rate in these sleepers is only \$8.50 to Pacific Coast points, two people being allowed to occupy one berth if desired. There are other new, convenient and economical features connected with these sleepers, which may be ascertained from Charles L. Hopkins, District Passenger Agent, Southern Railway, 828 Chestnut Street, Philadelphia, Pa.

THE

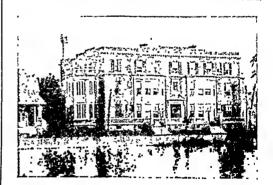
LENOX HOTEL

IN BUFFALO



High-Grade Modern Construction. Fire-proof throughout. European Rates, \$1.50 per day and upplan. Room reservations can be telegraphed at our expense

GEORGE DUCHSCHERER, Proprietor



SARAH LEIGH HOSPITAL NORFOLK, VA.

A new, thoroughly up-to-date private hospital. Rooms single or en suite. Private Baths. Ouiet surroundings. Salubrious Climate. Especially for Surgical, Gynecological and Rest Cure Cases. A few Medical cases taken.

Correspondence with physicians invited. Address one of the following:

DR. SOUTHGATE LEIGH, SURGEON IN CHARGE DR. STANLEY H. GRAVES, ASSOCIATE. MISS M. A. NEWTON, SUPERINTENDENT.

P. H. Laws Attempt To Protect Physicians

Physicians have informed us that when prescribing POND'S EXTRACT, the patient frequently purchases witch-hazel under the impression that the well-known staple article, medicinal POND'S EXTRACT, and the commercial witch-hazel are identical.

The substitution of such witch-hazel, on account of its cheapness, for medicinal POND'S EXTRACT is an obvious fraud on the physician, apt to imperil the health and life of the patient.

That such is the case is shown by the discussions on the subject of wood alcohol and substitutes for standard preparations recently published in medical journals; and the danger and injury of such substitutions have been emphasized by the enactment of Public Health Laws of 1890, (Chapter 661), as amended by the Laws of 1900, (Chapter 667,) and the Laws of 1901, (Chapter 649), which prohibit the sale of witch-hazel by all others than licensed pharmacists. Commercial witch-hazel has no standard of strength and quality, is subject to sophistication and adulteration and, in many cases, is rendered poisonous by wood alcohol and other deleterious substances employed in its preparation.



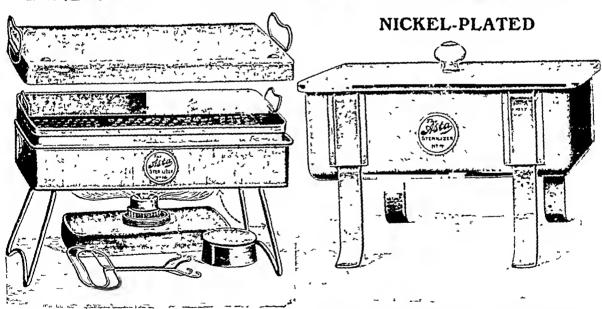
When prescribing POND'S EXTRACT, physicians should caution against the use of any substitute therefor.

Correspondence on the medicinal and surgical uses of POND'S EXTRACT is respectfully invited.

A STATE OF BUILDING SHEET BOOK THE PARTY OF THE

Pond's Extract Company, New York and London

"ASTA" Seamless Sterilizer



Boiler seamless, stamped out of solid metal, with folding legs. Perforated Metal Tray for holding instruments, with one pair of wire hoeks for lifting tray. Cover made of seamless metal, overlapping boiler. Prices, complete, with alcohol burner:

Under Buff Wrapper

> 7½ x 4 x 1½ inches . . . \$7.50 9½ x 5 x 2 " . . . 10.50 11 x 6 x 2½ " . . . 12.50 13¼ x 4¼ x 2 " 12.50

STYLE B.—Boiler seamless, stamped out of solid metal. Tray of perforated metal. Pair of Wire Hooks for lifting tray. Legs are detachable, thus making apparatus portable. Furnished in two sizes. Size No. 1, intended for "General Surgical Instruments," Size No. 2, for "Obstetrical Instruments," Price, without burner:

No. 1 size, $11 \times 6 \times 3^{\circ}$ (inches No. 2 " $16 \times 5 \times 4^{\circ}$ " . 15.00 Gas Burner for above . . 2.50 Alcohol Burner for above . . 2.75

The Valzahn Co. Manufacturers and Importers of High-Grade Surgical Goods 132 SOUTH ELEVENTH STREET, Philadelphia, Pa.





verything

NICAGO ELECTRO APPLIANCE CO

SNELL AMERICAN CYSTOSCOPE. COLD LAMP -- WATER OR AIR DILATATION -- DIRECT VISION.

THIS INSTRUMENT ARE COMBINED

The successful features of all other American or European instruments constructed for bladder inspection or ureter catheterization, together with the following seven additional important advantages:

First.-BOTH ureters can be catheterized at the same operation through one and the same catheter chamber.

Second.—One-third larger field of vision is obtained than with any other double catheter-izing cystoscope of SAME outside caliber.

-We give you the same size field of vision as other double catheterizing cystoscopes, but with the SNELL AMERICAN instrument of five sizes smaller caliber.

Fourth .- You can use either WATER OR AIR DILATION easily and successfully with the same instrument.

Fifth-An achromatic lens system giving a large and magnified field without reflexes or rainbow bues.

rainbow bues.

Sixth.—After BOTH ureters have been catheterized and catheters are entirely outside of cystoscope (see technique) you can examine both ureters and ascertain positively by seeing whether catheters are still in the ureters or not.

Seventh.—The most important and incalculable advantage is that when cystoscope is withdrawn from bladder and urethra, THE CATHETERS ARE NOT WITH. DRAWN (as is generally the case with all other instruments).

These seven very important features are the result of over one hundred actual demonstrations on living subjects, demonstrations which have been made with and for a large number of the most prominent surgeons in the United States, and if you are thinking of purchasing a cystoscope, you cannot afford to consider any instrument which does not give you these advantages.

Manufactured solely by CHICAGO ELECTRO APPLIANCE CO. 67 Wabash Avenue, Corner Randolph Street, Chicago, Ill.

THE NEW CHAMBERS'S ENCYCLOPÆDIA

Your Library

THE home where the New Chambers's is found, even if there are not ten other books, has a library to be proud of. Children who grow up there will become well-informed, cultured men and women.

The New Chambers's is far more useful than many more bulky and costly encyclopædias, because it is compact, convenient, and easy to consult. To find a single fact, you do not have to wade through a forty-page treatise. Yet its cross-references and other helps enable you to find easily all the information you want.

Which is Better?

1 100

THE New York Evening Post, the foremost literary authority in this country, says, "It is well known to how great an extent the various American encyclopædias are based on one edition or another of Chambers's.

"Why should you pay \$85 for an encyclopædia based on an old edition of Chambers's, when you can get the New Chambers's itself, the best of all the encyclopædias, for about one-half the price?"

WILL YOU BE IN TIME?

This offer is of temporary duration. The increased cost of material and labor necessitates an advance in price and terms at an early date.

Half the Price of Others

The New Chambers's is in ten large volumes, profusely illustrated, with fine modern colored maps, forming a complete Atlas of the World. For the use of the business man, the literary man, the school, or the library, it has always held its original position of superiority for authority, recency, accuracy, and convenience.

Only \$1.00 down

The rest in easy monthly payments

The complete set of the New Chambers's Encyclopædia will be delivered to you on payment of One Dollar down. You have the use of the work while you are paying the balance.

If, after examining it, you do not find it

PERFECTLY SATISFACTORY, it may be returned within ten days, and your dollar will be refunded.

BEAUTIFUL SPECIMEN PAGES FREE

Write to-day, enclosing the coupon below, and our handsome book of specimen pages, including large colored maps, and five full-page illustrations, with the interesting booklet, "The World's Wisdom," will be mailed FREE.

AGENTS WANTED

J. B. LIPPINCOTT CO.

Publishers

227 S. Sixth St., Philadelphia, Pa.

🔀 J. B. Lippincott Co., Philadelphia

Please send me Specimen pages of the NEW CHAMBERS'S

ENCYCLOPÆDIA, as advertised in.....

(WRITE YOUR NAME AND ADDRESS IN MARGIN BELOW)

Colorado's Climate

affords every delight to the seeker of health; abundance of sunshine and invigorating dry air; a climate approaching perfection, where the sky is clear and blue, and fog and dampness unknown; where the winters are mild and the summer heat never oppressive.

Its numerous delightful health and pleasure resorts are reached by the elegant trains of

THE COLORADO & SOUTHERN RAILWAY

The following publications sent on receipt of postage:

Picturesque Colorado . 3c. Colorado's Climate . . 2c. Resorts in Platte Canon 2c.

T. E. FISHER,

General Passenger Agent, Denver, Colo.

AN ACTIVE DEPLETANT FOR PELVIC CONGESTIONS.

The presence of congestion or inflammation, whether acute or chronic, involving the female pelvic cavity, forms grounds for anxiety. Fortunately we have passed the age where operative conclusions are hastily made. A superficial study of the vascular supply of the female pelvic organs, with its vesico-vaginal and vesico-uterine plexus forming a complete network of anastomosis, is sufficient to show that local applications of depleting agents to the vaginal and rectal canals form both practical and theoretical ideals in treatment, which, by purgative action, reduces the stasis of engorged cellular tissue and lowers vascular tension, thus aiding nature in restoring normal glandular action. Glyco-Thymoline, in contact with mucous membranes everywhere, produces the following physiological activities in direct proportion to the vascularity of the structure. It stimulates the secreting cavity of glandular structure of all mucous surfaces, so that larger quantities of watery fluids are exuded. On the law of exosmosis, which determines the passage of fluids through animal membranes from a rare to a more dense saline medium, this solution, through its stimulating and hygroscopic property, brings about a rapid depletion, drawing outwardly through the tissues the products of inflammation and unaterially reducing the danger of septic infection.

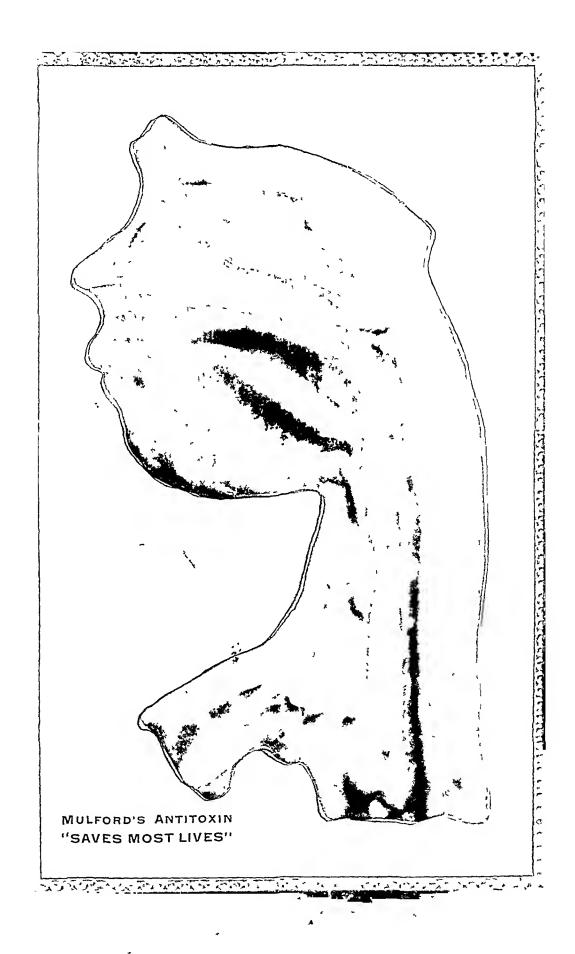
COMMENT ON ANTIKAMNIA AND HEROIN TABLETS.

Under the head of "Therapeutics," the Medical Examiner contains the following by Walter M. Fleming, A.M., M.D.*, regarding this valuable combination: "Its effect on the respiratory organs is not at all depressing, but primarily it is stimulating, which is promptly followed by a quietude which is invigorating and bracing, instead of depressing and followed by lassitude. It is not inclined to affect the bowels by producing constipation, which is one of the prominent effects of an opiate, and it is without the unpleasant sequels which characterize the use of morphine. It neither stupefies nor depresses the patient, but yields all the mild anodyne results without any of the toxic or objectionable phases.

any of the toxic or objectionable phases.

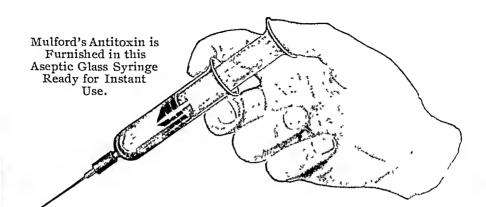
When there is a persistent cough, a constant "hacking," a "tickling" or irritable membrane, accompanied with dyspnœa and a tenacious mucous, the treatment indicated has no superior. In my experience I found one "Antikamnia and Heroin Tablet" every two or three hours, for an adult, to be the most desirable average dose. For night-coughs, superficial or deep-seated, one tablet on retiring, if allowed to dissolve in the mouth, will relieve promptly, and insure a good night's rest."

*Qualified Examiner in Nervous and Mental Diseases for Supreme Court, New York City.



NASAL DIPHTHERIA, WITH TONSILLAR AND LARYNGEAL INVOLVEMENT

Note small amount of membrane present on tonsils. Important to examine naso-pharynx in every case and not wait until membrane develops in the anterior nares. In Nasal Diphtheria administer 8000 to 10,000 units of Mulford's Antitoxin; repeat every six to eight bours



REPORTS of 1902* from twenty-five of the leading cities of the United States, show:

That the average mortality from Diphtheria where Antitoxin was used was 6.48 per cent.

The mortality from Diphtheria in the same cities,

Where Antitoxin was not used was 32.5 per cent.

This means that Antitoxin has reduced the mortality over three-fourths, and that over 75 out of every 100 recovering from Diphtheria owe their lives to Antitoxin.

Early Use Important

The same reports show the results of giving Antitoxin éarly and in delaying its use.

The average mortality of cases treated with Antitoxin:

On the First day, was 1.45 per cent Second day, 3.9 per cent Third day, 5.67 per cent Fourth day, 7.29 per cent Later than Fourth day, 14.49 per cent

Dr. H. C. Wood says that as soon as Diphtheria is suspected Antitoxin should be used. If Diphtheria develops, the disease is under control; if diagnosis is not confirmed, no harm has been done by the use of a reliable Antitoxin.

The Chief Justice of one of the State Supreme Courts says: "Any physician who delays administering Antitoxin until the later stages of Diphtheria is guilty either of criminal negligence or criminal ignorance."

*Full detail reports, with new literature, mailed upon request.



All authorities agree that 1000 units of Antitoxin, administered to those exposed, give absolute protection against Diphtheria.

Mulford's Antitoxin is Absolutely Harmless

During the last ten years millions of doses of Mulford's Antitoxin have been given without a single unfavorable result.

Mulford's Antitoxin is prepared in the largest and bestequipped laboratory in existence devoted to the exclusive production of Antitoxin.

No expense is spared in production; every detail of preparation is under the constant supervision of bacteriologists of international reputation.

Every Dose is Furnished in an Aseptic Glass Syringe

This idea originated with us and was perfected before we offered it to the profession. Physicians write us enthusiastic letters commending it in the highest terms. We supply Antitoxin in one style of package only—and that the best.

Advantages

Air never touches the serum and cannot contaminate it! Air cannot be injected from our syringe with the subsequent danger of causing an embolism!

Always ready for any emergency! The rubber tube connecting needle with syringe avoids any danger of lacerating the flesh or breaking the needle in the patient.

One hand has absolute control of the syringe, leaving the other hand free to control patient or for any emergency. The syringe is earefully annealed and there is no danger of a broken syringe injuring the physician's hand.

Should you be unacquainted with our Serum-Syringe Container, we will be glad to forward free a water-filled syringe for demonstration.

New and valuable literature on Antitoxin mailed free.

H. K. MULFORD CO., Chemists

PHILADELPHIA

New York Chicago St. Louis San Francisco New Orleans Toronto

A. H. ALTSCHUL

MAKER OF ALL KINDS OF BRUSHES

FOR



HOSPITALS'
AND
INSTITUTIONS'
USE

URINAL BRUSH

Made of pure, stiff bristle, with metal handle, 18 inches long. Will stand boiling aind sterilizing. Curved so as to reach all parts of the Urinal. This is the best Brush on the market for cleaning Urinals.

Price per Dozen

Made of pure, stiff bristle. Will stand boiling and sterilizing. This is the best Brush on the market for cleaning Bed Pans.



BED PAN BRUSH

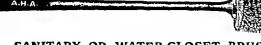
Price per Dozen

RADIATOR BRUSH

This is the only Brush of its kind for getting in between the coils of Radiators, cleaning them thoroughly.

Price per Dozen

No. 220. Stmight Handle, 27 inches long, stiff bristle. .\$12.00 No. 221. Curved Handle, 27 inches long, stiff bristle. . 15.00 No. 222. Straight Handle, 27 inches long, mixed bristle, 9.00 No. 223. Chryed Handle, 27 inches long, mixed bristle, 12.00 The Straight Handle is the stronger.



SANITARY OR WATER-CLOSET BRUSH

The only perfect Brush for cleaning Sinks, Hoppers, and Toilets.

Price per Dozen

No. 345. Large, \$5.50 No. 346. Med'm, 5.00 No. 347. Small, 4.50 No. 350. Samo as style 345, but solid back and stiffer, large size only..... 6.50



NAIL BRUSH

Made of best Russia bristle. Only waterproof Brush on the market. Doctors' favorite.



Price per Gross

No. 355. Large, \$3:50 No. 356. Med'm, 3.00 No. 357. Small, 2.50 These Brushes are

these Britishes are used in every hospital in the country. Sold by druggists for 5 and 10 cents each. My price, less than 2 cents.

NAIL SCRUB

Made of stiff Tampico. Best for Surgical work.

71 PARK PLACE, Cor. Greenwich, NEW YORK

Bailey's Pure Whiskey Endorses Bureau of Health Chemists

that they occasionally use a pure whiskey, comes the following remarkable endorsement from Doctor William C. Robinson, chemist of the Philadelphia Bureau of Health: To the testimony of some of the best known physicians of Philadelphia, and that of nurses whose professional duties demand

I have teeled five quarts of whiskey labelled "Bailey's Rye Whiskey," taken in sealed bottles by me from the stock exposed for sale at your store, 1209 Market Street, by six different methods, mucluding three well known ones (the Miller, the Resorcinol, and the Phloroglacin). In all the samples, and by all the methods, the results write negative. In other words, I found these whiskies to be free from adulteration and all foreign and injurious admixtures.

The same chemist analyzed our wines, and found them free from all

the Franklin Institute, when its absolute purity was pronounced. adulterations or preservatives.
An analysis of the whiskey was also made some years ago by

SPECIAL OFFER TO PHYSICIANS AND NURSES.

only to physicians and nurses, for home or professional use. In order to give professional practitioners the opportunity of observing the excellent quality of Bailey's Pure Rye for themselves, we will send to any address, one gallon of the \$1.50 per quart whiskey (the famous Yellow Label), for \$4.00—a discount of 33% per cent. On all orders after that we will allow a 10 per cent, discount. This is open orders after that we will allow a 10 per cent, discount.

Write for copies of analysis, etc.

1209 Market Street

HUEY & CHRIST

PHILADELPHIA

Virginia Hot Springs

MISCALING WITE THE AM TO

ETHERE

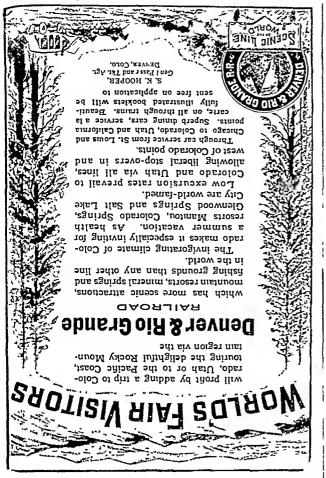
ВАЗУ ЗНТ ЈЈА ИЗЧО SOO FEET ELEVATION

Waters, baths, hotels and Scenery nowhere equalled

Brokers' office with direct X, Y, u ire. strictest sense, and patronized by the highest class times. THE MEW HOMESTEAD is modern in the Golf, swimming pool, fine livery and outdoor pascured. New hydrotherapeutic apparatus installed. Rheumatism, gont, obesity and nervous diseases

ets to Cincinnati, Louisville, Chicago, St. Louis, and

nay, offices of Penna. R. R. and connecting lines time. Exeursion tickets at C. & O. offices, 362 Broad-Z. Y. 1.55 p.m., arrives Springs 8.25 a.m., eastern



TIAM T'NOa

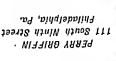
but go now to until your health is gone,

ENBEKY SPRINGS, ARK.

venient. usm: and it's so conmake you feel like a new clear, curative water will mountain air and the cool, dry, pure, pine-laden A week or two of the

ALCHT FROM ST. *3N0* SINOT

Write for "The Summit of The Ozarks."





HAL, S. RAY, G. E P. A., 401 BROADWAY, NEW YORK.

NEMS FOUR-TRACK LHE

of Travel and Education An Illustrated Magazine

MORE THAN 128 PAGES MONTHLY

its scope and character are indicated by the following titles of articles that have appeared in recent issues; all profusely illustrated:

Alexander Porter Isabet R. iVallach Villiam Wall לנומגנסונג הנוון Kirk Munvoe
M. Midy Toylor
M. Midy Toylor
M. Midy A. Ob. Shiddled
Manda L. Greig
Manna M. Shan
Manna M. Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Manna
Mann

Down the Golden Yukon
Little Historics Develict
Where Lincoln Died
The Poets' Corner
The Poets' Corner Among Golden Pagodas

Alaubichead

A Saudy in Shelis

A Gala Might on the Neckat

Eleven House of Afternon

Eleven House

Eleven House

Eleven House

Coll in the Rockies

Eleven House

Eleven House

A Balors' Snug Harbor

A Balors' Snug Harbor

Eleven House

A Balors' Snug Harbor

A Balors' Snug Harbor

Eleven House

I Herbert House

I Herbert House

I Herbert House

I Harbert House

I Harbe

Commencing January 1, 1905, the subscription price will be \$1.00 a year; foreign countries, \$1.50. At news stands, 10 cents a copy. Subscriptions for the balance of 1904 and for 1905 will be received up to December 31, 1904, at the rate of 50 cents a year; foreign countries, \$1.00. At news stands, 5 cents a copy.

Room No. 13, 7 East 42d Street, New York GEORGE H. DANIELS, Publisher

1025 Suffer Street, St. Winifred's Hospital,

SAN FRANCISCO, CALIFORNIA.

with Fifty Sunny Rooms. Centrally A New FIRE-PROOF Hospital

WINSLOW ANDERSON, M.D., M.R.C.P. Lond., etc., torium for Medical and Surgical Cases. A Private Sana-Rooms in the West. located. The most Modern Operating

Medical Director.

FREE

POLYCLINIC TABLE THE 20TH CENTURY Catalogue F.

Indianapolis, Ind. THE PERFECTION CHAIR CO. Manufactured by



ARTIFICIAL LEG 🗷 The WALKEASY

Our Art Catalog contains valuable information on Care and Treatment of Stump Preparatory to applying an Art Limb. How Soon to Apply, Art Limbs for Children. Directions for Self-Aleasurement, etc., etc.

Сеовсе В. Fuller Co., Rochester, И. У. Въписьом, Сысадо. Вийлы, Вомгон, Ридасірыц

APPENDICITIS. WHEN TO OPERATE IN

essary. The dressing should be renewed, when it can be easily peeled off, generally in twelve to twenty-four hours. is cut short and operation becomes unnecinflammation is often resolved, the attack suitable compress. When used early the and cover with absorbent cotton and Spread warm and thick over the abdomen Antiphlogistine. əsn nndecided While That is the question, or later?

Approved

FYCTY PACKAGE Of Serum and vaccine marketed by us is stamped

It means that our biologic plant is carefully inspected by disinterested medical experts in the Government service; and that every detail is to their liking, including—

Construction, equipment, and cleanliness of buildings. Methods of production and testing. Personnel of principal employes. Purity and strength of products.

Absolutely everything that could affect the quality of the serum or vaccine is included in this inspection.

The inspector conies wholly unannounced; sees the work precisely as it is always done; sees the normal condition of the laboratories, operating rooms, and stables; and reports to Dr. Walter Wynnan, Surgeon-General of the Public Health and Marine Hospital Service.

The stamp of Government approval is thus a potent guaranty of the purity, safety and reliability of our products, confirming the reputation they have had from the first.

Our serums are marketed in the Simplex, the simplest, strongest and only wholly satisfactory piston-syringe serum container before the profession.

Write "Alust be Stearns" on your orders to insure getting the best serum in the best syringe.

Biologic Laboratories of

FREDERICK STEARNS & CO.

Detroit, Mich., U. S. A.

INTERNATIONAL CLINICS

VOLUME III. FOURTEENTH SERIES. Cloth, \$2.00.

CONTENTS.

SYPHILIS.

UNCERTAINTY AS TO SYPHILITIC INOCULA-TION. By Campbell Williams, F.R.C.S. (Eng.)

THE DIFFERENTIAL DIAGNOSIS OF SYPHI-LITIC ERUPTIONS. By A. H. Ohmann-Dumesnil, A.M., M.D., Ph.D.

SYPHILITIC FEVER. By G. A. Carriere, M.D.

SYPHILITIC HEADACHE AND LUMBAR PUNC-TURE. By G. Milian, M.D.

SYPHILIS OF THE NERVOUS SYSTEM. By William G. Spiller, M.D.

LARYNGEAL SYPHILIS AND TABES. By A. Chauffard, M.D.

SYPHILIS AND SUICIDE. By Alfred Fournier, M D.

HYPERACUTE SECONDARY SYPHILITIC NE-PHRITIS WITH FATAL OUTCOME IN SPITE OF MERCURIAL TREATMENT. By. Drs. Chauffard and Gouraud.

FETAL SYPHILIS. By J. W. Ballantyne, M.D., F.R.C.P. (Edin.), F.R.S. (Edin.)

THE TREATMENT OF CHANCRE. By Thomas R. Neilson, M.D.

THE HYPODERMATIC TREATMENT OF CONSTI-TUTIONAL SYPHILIS. By William S. Gotthell, M.D.

THE TREATMENT OF SYPHILIS BY CALOMEL INJECTIONS. By Alfred Fournier, M.D.

TREATMENT.

THE TREATMENT OF THE DIGESTIVE DIS-TURBANCES OCCURRING IN PULMONARY TUBERCULOSIS. By Lawreson Brown, M.D. REST-CURE IN THE TREATMENT OF CHRONIC CONSTIPATION. By Ismar Boas, M.D.

THE TREATMENT OF DIABETES MELLITUS. By T. Stuart Hart, A.M., M.D.

MEDICINE.

OBSERVATIONS ON INDIGESTION. By By W. H. Allehin, M.D. (Loud.), F.R.C.P., F.R.S. (Edin.)

MITRAL OBSTRUCTION AND CHRONIC BRON-CHITIS. By William H. Katzenbach, M.D. DISEASES OF THE LIVER. By Louis Faugeres Bishop, A.M., M.D.

SCURVY. By Andrew Duneau, M.D., B S., (Lond.), M.R.C.P., F.R.C.S.

SURGERY.

UMBILICAL HERNIA IN THE FEMALE, WITH THE REPORT OF THREE CASES OF THE STRANGULATED VARIETY OCCURRING IN WOMEN, TWO OF WHOM WEIGHED OVER 300 POUNDS EACH. By Thomas H. Manley, M.D., Ph.D.

FOREIGN BODIES IN THE BRONCHL. By Drs Lermoyez and Guisez.

THE TECHNIC, DIAGNOSIS, SIGNIFICANCE, AND THERAPEUTIC APPLICATION OF LUMBAR PUNCTURE. By Purves Stewart, M.A., M.D., M.R.C.P.

THE PATHOLOGY AND OPERATIVE TREAT-MENT OF ACUTE OSTEOMYELITIS AND OS-TEOSARCOMA. By Charles Greene Cumston, M.D.

GYNECOLOGY.

THE NON-OPERATIVE TREATMENT OF DIS-ORDERS OF MENSTRUATION. By Francis H. Davenport, M.D. HEMMORRHAGE AT AND AFTER THE MENO-PAUSE. By Cuthbert Lockyer, M.D., F.R.C.S., M.R.C.P.

SOME REMEDIAL AGENTS IN THE TREATMENT OF GYNECOLOGIC AFFECTIONS. By Chauncey D. Palmer, M.D.

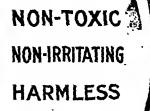
NEUROLOGY.

PARALYSIS AGITANS. By F. W. Langdon, M.D.

J. B. LIPPINCOTT COMPANY

Publishers

Philadelphia





ANTISEPTIC DISINFECTANT DEODORANT

Dioxogen is a medicinal solution of H_2O_2 with a well established reputation for purity and reliability. It has for many years been known as the kind that keeps and is always specified by the careful prescriber.

Dioxoge Dioxog

It is a powerful germicide, but is harmless to healthy tissues; destroys pus and septic materials; has a mechanical action which dislodges dirt from accidental wounds. Of indispensible value in modern minor surgery. Adhered dressings easily and painlessly removed by its use.

SHOULD ALWAYS BE CARRIED IN THE EMERGENCY BAG.

THE OAKLAND CHEMICAL CO. NEW YORK CITY.

A Sense of Surgical Security

comes only when operative resourcefulness is backed by reliable working tools.

Operative skill of the highest order may be set at naught by an inferior or contaminated catgut. The

"Van Horn" Catgut

is always sterile and invariably dependable as regards tensile strength and absorbability.

Each strand is like every other strand of the same size. Every strand is sterile beyond question.

VAN HORN & SAWTELL New York



Rheumatism of cloints and Fascias.

Agents: E. Fougera & Co., 26=30 N. William St., N. Y.



Reduces Pain, Swelling & Hyperemia in the articulations.

Agents: E. Fougera & Co., 26=30 N. William St., N. Y.

Treasury Department

BUREAU OF PUBLIC HEALTH AND MARINE HOSPITAL SERVICE

Washington, D. C., June 29, 1904

A board of officers will be convened to meet at the Bureau of Public Health and Marine Hospital Service, 3 B Street, S. E., Washington, D. C., Monday, October 3, 1904, at 10 o'clock A.M., for the purpose of examining candidates for admission to the grade of Assistant Surgeon in the Public Health and Marine Hospital Service.

Candidates must be between twenty-two and thirty years of age, graduates of a reputable medical college, and must furnish testimonials from responsible persons as to their professional and

moral character.

The following is the usual order of the examinations: 1. Physical. 2, Oral. 3. Written. 4. Clinical.

In addition to the physical examination, candidates are required to certify that they believe themselves free from any ailment which would disqualify them for service in any climate.

The examinations are chiefly in writing, and begin with a short autobiography of the candidate. The remainder of the written exercise consists in examination of the various branches of medicine, surgery, and hygiene.

The oral examination includes subjects of preliminary education,

history, literature, and natural sciences.

The clinical examination is conducted at a hospital, and when practicable, candidates are required to perform surgical operations on a cadaver.

Successful candidates will be numbered according to their attainments on examination, and will be commissioned in the same order as vacancies occur.

Upon appointment the young officers are, as a rule, first assigned to duty at one of the large hospitals, as at Boston, New York, New Orleans, Chicago, or San Francisco.

After five years' service, assistant surgeons are entitled to examination for promotion to the grade of passed assistant surgeon.

Promotion to the grade of surgeon is made according to seniority, and after due examination as vacancies occur in that grade.

Assistant surgeons receive sixtccn hundred dollars; passed assistant surgeons two thousand dollars; and surgeons twenty-five hundred dollars a year. When quarters are not provided, commutation at the rate of thirty, forty, and fifty dollars a month, according to grade, is allowed.

All grades above that of assistant surgeon receive longevity pay, ten per centum in addition to the regular salary for every five years' service up to forty per centum after twenty years' service.

The tenure of office is permanent. Officers travelling under orders are allowed actual expenses.

For further information, or for invitation to appear before the board of examiners, address

SURGEON: GENERAL
PUBLIC HEALTH AND MARINE HOSPITAL SERVICE
WASHINGTON, D. C.

THE POST-NAT

can be fully & REATMENT

INGLENIA PHITIS,

The most dependable remedy for all stomach troubles.

Valuable as an adjunct in Calomel administration.

Highly successful in relieving the Vomiting of Gestation.

WM. R. WARNER & CO.

PHILADELPHIA

NEW YORK

CHICAGO

NEW ORLEANS

The

Young Physician

Will find that wasting conditions are responsible for much of the trouble he is called upon to treat. He will find, too, that these wasting diseases will, as a rule, be helped more by Scott's Emulsion than any other one remedy available. It's the perfect combination of pure cod liver oil, hypophosphites of lime and soda and glycerine that makes Scott's Emulsion the sheet anchor in the treatment of weakness and wasting.

We're always glad to furnish a liberal sample of Scott's Emulsion for a clinical test.

SCOTT & BOWNE 409 Pearl St., New York City

Trensury S

HEALTH URGERY

Monthly Review of Surgical Science and Practice.

Edited by LEWIS STEPHEN PILCHER, M.D., LL.D., of New York.

WITH THE COLLABORATION OF

SIR WILLIAM MACEWEN, M.D., LL.D., WILLIAM WHITE, Ph.D., M.D.,

OF PHILADELPHIA. Or GLASGOW.

> W. WATSON CHEYNE, C.B., F.R.S., OF LONDON.

TARIF OF COMPENIE

LANDELL OI	OCIATION -
ORIGINAL MEMOIRS. I. On the Morphology of Carcinoma and the Parasutic Theory of its Etiology. By Genem-Medizinalrath Professor Doctor Johannes Orth	XII. Intra-Abdominal Torsion of the Entire Great Omentum. By Charles L. Scudder, M.D
f. William White, M.D	tive Tissue. By Harry H. German, M.D
IV. The Operative Treatment of Caucer of the Breast. By f. Collins Warren, M.D Hon F.R.C.S (Fing.) 805 V. Modern Bullet Wounds. By Frank W. Foxworthy, M.D 834	M.D. 943 XVI. Undescended Testicle. By Walter B. Odiorne, M.D., and Channing C. Simmons, M.D. 962 XVII. I. Hypernephroma of Kidney 11. Fi-
VI. Some Experiments with a New Method of Closing Wounds of the Larger Arteries. By George Emerson Riewer, M.D	bro-Adenoma of Inner Wall of Ileum. By Francis S. Watson, M.D 1005 TRANSACTIONS OF THE NEW YORK
VII Birth-Fracture of the Skull By James, H. Nicoll, M.D	SURGICAL SOCIETY. STATES MEETING, October 26, 1904 1010
VIII. Divalsion in Esoph igeal Strictures by Means of a New Instrument. By Roberto Alessandri, M.D 870 IX. Parotitis following Injury or Disease	EDITORIAL ARTICLE. THE Annals of Surgery, 1885-1904 1028
of the Abdominal and Pelvie Viscera. By Evennan Dyball, M.B., B.S., FRICS	REVIEWS OF BOOKS. Treves: A Manual of Operative Surgery 1033 Rerry: A Manual of Surgical Diagnosis 1036
X. Duodenal Ulcer. By William J. Mayo, M.D	Dudley: The Principles and Practice of Gyne-
Stomach. By James P. Warbasse, M.D	cology 1038 Taylor Genito-Urinary and Venereal Diseases and Syphilis 1042

Published Monthly by J. B. LIPPINCOTT COMPANY, Philadelphia, Pa.

and Syphilis

GREAT BRITAIN: CASSELL & Co., LIMITED. AUSTRALASIA: CHAS. MARKELL & Co., LONDON. SYDNEY, N. S. W.

Price in United States, \$5.00 a Year in Advance. Single Number, 50 Cents.

Price in Great Britain and Australasia.

One Guinea a Year in Advance. Single Number, Two Shillings.

IN THE TREATMENT OF

and a server a server and a server a server and a server a server and a server a server and a server a server and a server

ANÆMIA, NEURASTHENIA, BRONCHITIS, INFLUENZA, PULMONARY TUBERCU-LOSIS, AND WASTING DISEASES OF CHILDHOOD, AND DURING CONVALESCENCE FROM EXHAUSTING DISEASES,

THE PHYSICIAN OF MANY YEARS' EXPERIENCE

KNOWS THAT, TO OBTAIN IMMEDIATE RESULTS, THERE IS NO REMEDY THAT POSSESSES THE POWER TO ALTER DISORDERED FUNCTIONS, LIKE

"Fellous' Syrup of Hypophosphites"

MANY A TEXT-BOOK ON RESPIRATORY DISEASES SPECIFICALLY MENTIONS THIS PREPARATION AS BEING OF STERLING WORTH.

TRY IT, AND PROVE THESE FACTS.

NOTICE.—CAUTION.

THE success of Fellows' Syrup of Hypophosphites has tempted certain persons to offer imitations of it for sale. Mr. Fellows, who has examined samples of several of these imitations, finds that no two of them are identical, and that all of them differ from the original in composition, in freedom from acid reaction, in susceptibility to the effects of oxygen when exposed to light or heat, in the property of retaining the strychnia in solution, and in the medicinal effects.

As these cheap and Inefficient substitutes are frequently dispensed instead of the original, physicians are earnestly requested, when prescribing the Syrup, to write "Syr. Hypophos. FELLOWS."

SPECIAL NOTE.—Fellows' Syrup is never sold in bulk, but is dispensed in bottles containing 15 oz.

MEDICAL LETTERS MAY BE ADDRESSED TO

MR. FELLOWS, 26 CHRISTOPHER STREET, NEW YORK.

INDEX TO ADVERTISEMENTS

minal Supporter (G. W. Flavell & Bro.), 9 chol Gas-Stove, Glogau's Improved (H. -Glogan), 41 mbulatory Pneumatic Splint (Ambulatory Pneumatic Splint Manufacturing Co.), 29 Anasarcin (Anasarcin Chemical Company), 56 Annals of Surgery (Combination offer), 45 Artifielal Limb Company, The Winkley (Jepson Brothers), 16 Antikamnia Tablets (Antikamnia Chemical Company), 3 Antiphiogistine (The Denver Chemical Manufacturing Company), 13 Antiseptic Local Anesthetic, Dr. R. B. Waite's (Antidolar Manufacturing Company), 8 Antitoxin, Stearn's (Frederick Stearns & Company), 35 Artificial Limbs (A. A. Marks), 3 Association of Military Surgeons of the United States, Journal of The (Association of Military Surgeons), 38 Baccarat, 25 Brushes (A. H. Altschul), 55 Cabot's Sulpho-Napthol (The Sulpho-Napthol Company), 50 Catgut, "Vanhorn" (Vanhorn & Sawtell), 58 Chalfonte, pany), 4 Atlantic City (The Leeds Com-Chlorides, Pintt's, 43 Christmas Diamonds (Loftus Brothers & Company), 32 Chronicles of Don Q., 25 Conch-Ambuiance, The "New Agnew" (Fulton & Walker Company), 37 Colorado and Southern Railway, The, 26 Denver and Rio Grande Railroad, 30 Dloxogen (The Oakiand Chemical Company), Dresses, Nurses' (Strawbridge & Ciothier), 54 Duotonol (Schering and Glatz), 7 Elastic Stockings (G. W. Flavell & Bro.), 9 Electro-Thermic Angiotribe, Downes's (Chas. Lentz & Sons), 28 Engravings (Gatchei & Maninng), 12 Eurcka Springs, Arkansas (Perry Griffin), 27 Exodin (Schering & Giatz), 7 Extract, Palist (Pabst Extract Laboratory), 49 Extract, Pond's, 41 "Fellows' Syrup of Phosphates," 1 Flavell's Elastie Trusses (G. W. Flavell & Bro.), 9 Formalln Lamp (Schering & Glatz), 7

Gas-Stove, Alcohol, Glogau's Improved (H. Glogau), 41 Gatchell & Manning, Engravings, 12 Genito-Urinary Irrigation Basin (The Valzahn Company), 41 Glycerin Tonic Comp., Gray's (The Purdue Frederick Company), 16 Glyco-Heroln (Martin H. Smith Company), 4 Glyco-Thymoline (Kress & Owen Company), 9 Hospital, St. Winlfred's, 27 Hydroleine (The Charles N. Crittenton Company), 36

Irrigation Basin, Genito-Urinary (The Valzalın Company), 41 Kutnow's Powder (Kutnow Bros., Ltd.), 11

Lignol (The Girard Company, Inc.), 53 Lippineott's Magazine (Combination offer), 44 Listerine (Lambert Pharmacal Company), 1' Malt Extract, Goldbeck's (John F. Betz & Soi Ltd.), 31 Medical Register and Directory (R. L. Polk Company), 6 Medical Works of J. B. Lippincott Compan; 18, 19, 20, 21, 22, 23, 24, 46, 48 Mexico, National Lines of, 50 Missouri Paelfie Railway, 50

National Lines of Mexico, 50

Oceanic Steamship Company, 30 Office and Library Furniture (Joseph D. Shomaker & Co.), 8 Operative Surgery (P. Blakiston's Son & Co.

Orthoform (Vietor Koechl & Co.), 5 Orthopedie Surgery, The American Journal (P. Blakiston's Son & Co.), 52

Pabst Extract (Pabst Extract Laboratory), 4 Perfection Matiress, The Hygienic (Perfectio Mattress Company), 33 Phenol Sodique (Hance Bros. & White), 42

Photo Buckle, The (Hewes & Potter), 31 Physicians Defence Company (Fort Wayne Indlana), 6

Platt's Chlorides, 43
Polyclinle Chair, The Twentleth Century (The Perfection Chair Company), 29
Printing Ink Company (Ltd.), W. D. Wilso (Harry Turner, Philadelphia, representative), 40

Pure Whiskey, Bailey's (Huey & Christ), 28 Pyroligueine (The Pyroligneine Company), 4

Quilted Mattress Pads (Exceisior Quilting Con pany), 6

Roentgen X-Ray Laboratory, Chicago (W. (Fuelis), 7 Regai Shoe Company, (Inc.), 39

Sal Hepatica (Bristoi-Myers Company), 29 Salt Lake in Winter, 30

Sanitarium, Dr. Broughton's (Rockford, Ill nois), 6

Sarah Leigh Hispital (Norfolk, Va.), 34 Seaboard Air-Line Railway (Fiorida), 14 Snell American Cystoscope (Chicago Electri Appliance Company), 42 Sulpho-Napthol, Cabot's, The Sulpho-Naptho

Company), 50

Supporting Beits (Pomeroy Company), 27

Tabard Inn Library, The, 10 Tryptogen (Carnrick) (G. W. Carnrick Conpany), 14

Underwear, Dr. Deimel (The Deimel Liner Mesh Company), 5 Uniforms, Nurses' (E. A facturing Company), 53 A. Armstrong Manu

United Fruit Company's Steamships (Unite Fruit Company), 47 Ur-a-sol Chemical Manufacturin

ca-sol (Organie Company), 15 Urotropin (Schering & Glatz), 7

Uterine Supporters, Flaveil's (G. W. Flavell Itro.), 9

Vaceine (Glycerinated) (Parke, Davis & Co.) "Vanhorn" Catgut (Vanhorn & Sawtell), 58 Virginia Hot Springs (Fred Sterry, Manager)

Walkeasy Artificial I Fuller Company), 29 Leg, The (George I

ITH RUBBER HANDS AND FEET

Over fifty years of the most extensive experience with the most satisfactory results of any manufacturer in the world. The Rubber Hand and Foot possess the quality of yielding to every essential angle of the natural, without the use of complicated hinges, joints, and contrivances which annoy and render expensive their daily use.

The accompanying cuts represent a person who lost both legs by a railroad



accident, one above the knee and the other two inches below. He is able to walk half a mile in eight minutes, without a cane or assistance, except his artificial limbs with rubber feet. He can perform a day's work without unusual fatigue; can go up and down stairs—in fact, can do any of the ordinaries of life without exhibiting his loss.

Arms restore appearance and assis greatly in the performance of labor. From our NEW ILLUSTRATED MEASURING SHEET Artificial Limbs can be made and shipped to all parts of the world, without the presence of the patient, with guaranteed success. Those who live at a distance and would be inconvenienced by the journey to New York, can supply measurements, and feel the assur-

over 28,000 in use. Eminent surgeons commend the Rubber Foot and Hand. They are endorsed by the United States and many foreign governments. Received the only Grand Prize awarded to Artificial Limbs at the Paris Exposition. A treatise, containin 500 pages, with 800 illustrations, sent free, also measurement sheet.



A. A. MARKS, 701 Broadway, New York City

A Chestnut has a Burp OpiumaHabit AIN has relief in Antikamnia lab

WHICH DO NOT DEPRESS THE HEART DO NOT PRODUCE HABIT ARE ACCURATE-SAFE-SURE

MADE SOLELY BY

The Antikamnia Chemical Company. ST. LOUIS, MO. U.S.A.

The advent of the season in which

COUGH, BRONCHITIS, ASTHMA, WHOOPING COUGH, Etc.

Impose a tax upon the resources of every physician renders it opportune to re-invite attention to the fact that the remedy which invariably effects the inmediate relief of these disturbances, the remedy which unbiased observers assert affords the most rational means of treatment, the remedy which bears with distinction the most exacting comparisons, the remedy which occupies the most exalted position in the esteem of discriminating therapeutists is

GLYCO-HEROIN (Smith)

GLYCO-HEROIN (Smith) is conspicuously valuable in the treatment of Pneumonia, Phthisis, and Chronic Affections of the Lungs, for the reason that it is more prompt and decided in effect than either codeine or morphine, and its prolonged use neither leaves undesirable after-effects nor begets the drug habit. It acts as a reparative in an unsurpassable manner.

DOSE.—The adult dose is one teaspoonful, repeated every two hours, or at longer intervals, as the case may require.

every two nours, or at longer intervals, as the case may require.

To children of no or more years, give from a quarter to a half teaspoonful.

To children of three or more years, give five to ten drops.

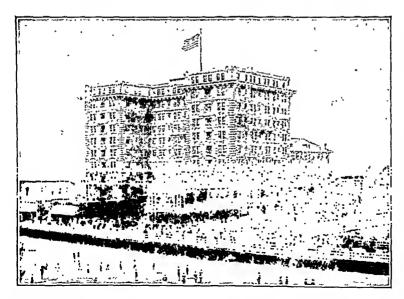
MARTIN H. SMITH CO. PROPRIETORS,

New York, N. Y.

Samples supplied, earriage paid, upon request,

CHALFONTE

ATLANTIC CITY, NEW JERSEY



This new Fireproof Structure was opened July 2, 1904, after the expenditure of over \$600,000.00 for improven ents.

Special provision has been made in it for those seeking read and recuperation at the seashore. It is different in many respects from other resort houses, but especially so in the increased amount of space devoted to the public and the variety and excellence of the table.

The patronage and favorable influence of the Medical Profession is solicited.

CHALFONTE THE LEEDS COMPANY

ON THE BEACH Atlantic City, N. J.

ORTHOFORM

Non-toxic and Non-irritating Local Anesthetic,
Antiseptic and Styptic. The application of
Orthoform to wounds of whatever character
relieves pain for hours, frequently days. Also
itching and pain of Pruritis, Eczema, Laryngeal
Tuberculosis, Otitis, Conjunctivitis, etc.
Used as sprinkling Powder, Insufflation, Emulsion
or Ointment.

Literature on application to

VICTOR KOECHL @ CO.



Winter is coming and with it the ever-increasing dread of **PNEU-MONIA**. To wear woolen underwear is but an urgent invitation for **COLDS** and **PNEUMONIA** to enter.

All who are subject to **COLDS** or threatened with bronchitis or pneumonia will observe an immediate change for the better by adopting the Dr. Deimel Underwear.

All Dr. Deimel Garments bear the Dr. Deimel name. For Sale at Best Dealers Everywhere. For Booklet, Samples and Full Information, address

THE DEIMEL LINEN-MESH COMPANY 491 BROADWAY, NEW YORK

SAN FRANCISCO, 111 Montgomery St. WASHINGTON, D. C., 1313 F Street, N.W.

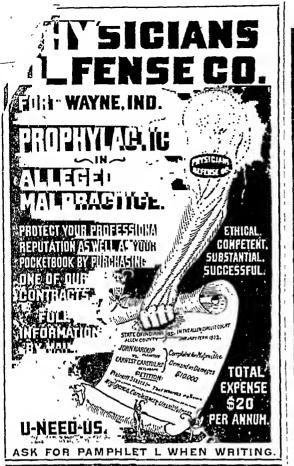
BROOKLYN, N. Y., 510 Fulton St.

BALTIMORE, MD. 110 W. Lexington St.

MONTREAL, CANADA, 2202 St. Catherine St.

LONDON, W. C., ENG., 83 Strand (Hotel Ceell).

Dr. Deimel Linen-Mesh Supporters, Suspensories, etc., are made and sold exclusively by J. ELLWOOD LEE CO., Conshohocken, Pa.



dr. broughton's Sanitarium

FOR THE CARE OF OPIUM AND OTHER DRUG ADDICTIONS, INCLUDING ALCOHOL AND SPECIAL NERVOUS CASES

For information, apply to

R. BROUGHTON, M.D. ROCKFORD, ILL.

POLK'S MEDICAL REGISTER

WAS ESTABLISHED IN 1886.

Do Not Be Deceived By Imitators.

See that the name R. L. POLK & CO.
IS ON THE ORDER BEFORE YOU
SIGN IT.

POLK'S is the only complete Medical Directory.

POLK'S is the only Medical Directory having an index to all physicians in the United States.

POLK'S has stood the crucial test of time with increasing popularity. It thoroughly covers the field.

L. POLK & CO., Publishers,

SUBSCRIBE NOW.

QUILTED Mattress Pads

AN acknowledged luxury for the bed, and endorsed by physicians for the nursery and for obstetrical purposes. These Pads are made of bleached white muslin, both sides quilted, with white wadding of the best grade between.



Keeps bed clean and sweet, mattress in a sanitary condition. Restful to sleep on. Saves labor and money. Babies can be kept dry and in comfort. Easily washed.

Send for sample.

Made in fourteen sizes. The popular sizes are: 18×34 , 27×40 , 36×76 , 42×76 , 54×76 .

For Sale in Dry Goods Stores

The Excelsior Quilting Co.

15 Laight Street, New York City

S C H E R I N G 'S

Exodin Tasteless and odorless cathartic, unique in promptness, reliability, pleasantness and harmlessness.

Duotono1 A 100% compound of Lime and Sodium Glycero-phosphates (1:1), convenient for dispensing and administration.

Urotropin Effects a urinary antisepsis that was wholly unattainable before its introduction by Prof. Nicolaier.

Formalin Lamp Renders infections shorter and milder, lessens danger of contagion. Invaluable in all zymotic diseases.

Literature on request.

SCHERING & GLATZ, New York.

CHICAGO

ROENTGEN X-RAY

LABORATORY

6000 Skiagraphs taken within past six years

SEND for book containing
Skingraphs of Tumors, Cysts,
and Blood Clots in the Brain;
Renal, Vesical, and Biliary Calculi; Diseases of Lungs; Cavities, Phthisis etc.; Diseases of
the Heart, Aneurisms, Pericarditis with effusion; Floating
Kidneys, Tumors, Bone Diseases,
Fractures, Dislocations; also
Deformities of the Hip, Spine,
and other parts of the body.

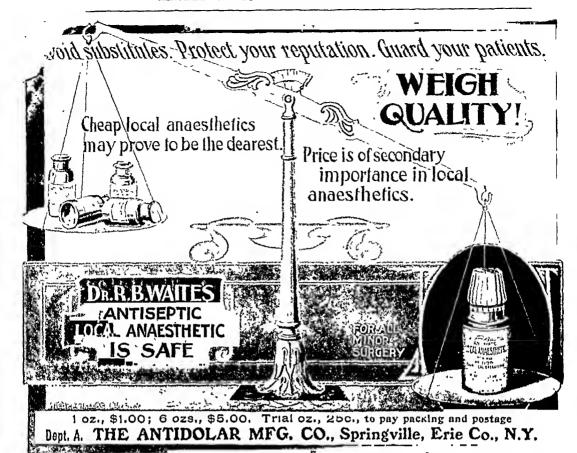
Established May, 1896 for Medical Diagnosis

W. C. FUCHS

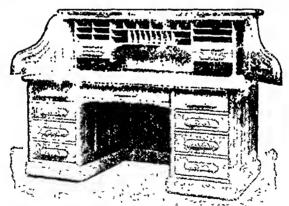
406-407-408 Schiller Bldg. 103-109 Randolph St. CHICAGO

Telephone Central 2255





HERE'S A RARE CHANCE!



SURPLUS WAREHOUSE STOCK

OFFICE AND LIBRARY FURNITURE

Mostly at wholesale prices, though there are many pieces that

WILL BE SOLD BELOW COST

We'd rather have fewer desks and more money, hence the sacrifice. This offer will hold good for 30 days, providing we then have any of the above stock remaining unsold.

Joseph D. Shoemaker @ Company

Established nearly a quarter of a century.

926-928 Arch Street, Philadelphia, Pa., U.S.A.

When writing, please mention Annals of Surgery.

Nature's method of providing against the admission of septic matter is by plastic infiltration, then follows an

Effort to wash out the offending matter by an exudation of serum.

To obstruct this wise system by the use of escharotic antiseptics, acts to

Produce conditions which have the effect of

Resolution

delaying

Glyco-Thymoline

Aids nature in her process of repair, maintaining the fibrin in soluble form, stimulating capillary circulation, fostering and sustaining cell growth, resulting in the rapid formation of healthy granulations. A practical dressing for all wounds, burns, and ulcerated conditions.

SAMPLES AND LITERATURE IF YOU MENTION THIS JOURNAL.

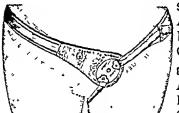
@ OWEN KRESS CO.

210 Fulton Street

New York

Flavell's Elastic Trusses,

Can be Worn Day and Night.



SINGLE TRUSS Adults 2 \$1.50 A. Plain 2.00 B. Fine C. Silk 2.50 DOUBLE TRUSS Adults E A. Plain \$2.50 3.00 🛱 B. Fine 4.00 D. C. Silk

PNEUMATIC PADS. Give circumference of abdomen on line of Rupture. State if for Right or Left

STOCKINGS. ELASTIC

H. G. F. receipt of price.
Safe delivery guaranteed.

Give exact Circumference and Length in all cases.

NET PRICE TO PHYSICIANS

Thread \$ Silk each each A to E \$2.50 \$2.00 \$1.50 0 A to G 4.25 3.50 4.50 m 6.00 5.00 1.50 C to E 1.25 E to G 1.50 A to C 1.50 Goods sent by Mail upon

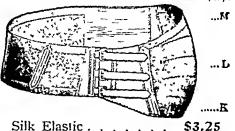
Send your Orders Direct to

G. W. FLAVELL & BRO.,

1005 Spring Garden St., Philadelphia, Pa. When writing, please mention Annals of Surger.

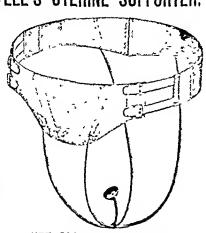
ABDOMINAL SUPPORTER.

Give exact circumference of abdomen at K, L, M



\$3.25 2.50 Thread Elastic

FLAVELL'S UTERINE SUPPORTER.



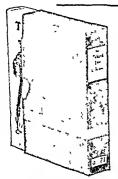
NET PRICE TO PHYSICIAYS

\$2.00

The Tabard Inn Library

-AND ITS-

Christmas Gift Offers



A Tabard Inn Book In a Tabard Inn Cloth Case

We are making two remarkable offers to Christmas book and magazine buyers. For \$1.50 we will send to you (or to any friend to whom you may wish to present the gift) an absolutely new book, and we will deliver it prepaid to any address in the United States. It will differ from ordinary books in this way. It will be in an attractive TABARD INN case and will be exchangeable forever at any of the 2,000 TABARD INN LIBRARY exchange stations in the United States and Great Britain. fee for exchanging the book will be only five cents. You can make your first selec-

tion from any book given in the list accompanying this advertisement; but should the list not contain the very book you want, select any book published provided the selling price is not more than \$1.50.

By adding \$1.75 to the above amount, making your total payment \$3.25, you can secure, in addition to your Tabard Inn Book, a year's subscription to The BookLovers Magazine, the



regular subscription price of which is \$3.00 a year or 25 cents a single copy. It is undoubtedly the newest magazine success. The December number contains 160 pages of magazine matter. There are eight beautiful color plates, twelve illustrations in sepia tint and over fifty pages of illustrations of the special articles and stories. We will make you a present of the December number (if you mention this advertisement when sending in your order), and in addition give you a fullypaid subscription for 1905. The regular price of THE TABARD INN service and

magazine is \$4.50; our special Christmas combination price is \$3.25. You may make two separate gifts of the offer if you We will enclose your card and Christmas greetings with the book or magazine. You can get no better Christmas gifts for the money. Send remittance by check or money order to

THE TABARD INN LIBRARY

Home Office

1030 Chestnut Street

Philadelphia

Special Christmas Book List

Chrisimas Eye on Lonesome John Fox, Jr. Nancy's Counity Chrisimas Eleanor Hoyt A Box of Malches Hamblen Sears A Chicago Princess Robert Barr
A Young Man in a Hurry
Robert W. Chambers
The Abbess of Vlaye Stanley J. Weyman Black Friday Frederic S. Isham Dialstone Lane Double Harness Anthony Hope Compromises Agnes Repplier Kale of Kale Hall Ellen Thorneycroft Fowler Law of the Land Emerson Hough Caplains of the World Gwendolen Overton The Sea Wolf Fack London The Prodigal Son Hall Caine The Man on the Box Harold MacGrath The Prospecior Raloh Connor Orrain S. Levett-Yeats The Maraihon Mysiery Burton E. Stevenson The Youth of Washington S. Weir Mitchell The Georgians
Will N. Harben
The Eagle's Shadow James Branch Cabell The Masquerader Katherine Cecil Thurston The Truanis A. E. W. Mason

The Son of Royal Langbrilh The Madigans Miriam Michelson

Trily

Elizabeth Stuart Phelps

Trailor and Loyalisi

Henry Kitchell Webster

My Lady of the North

Randall Parrish

Monarch Ernest Thompson-Seton Where Does the Sky Begin? Washington Gladden Trailits and Discoveries

Rudyard Kieling Whosoeyer Shall Oilend . Marion Crawford New Samaria

S. Weir Mitchell

Kutnow's improved Powder

"The Practitioner," England, says:—

MARCH, 1904

"This preparation possesses a pleasant taste It is a very pleasant form of laxative medicine, acting, if taken in hot water before breakfast, on an empty stomach, in the space of about one hour. Kutnow's Powder will be found most useful by sufferers from hemorrhoids, as it is gentle in its effects, while relieving the loaded portal system by its hydragogue action."

ENDORSED BY

Especially valuable for Surgeons after operations, to overcome the nausea after the anesthesia and to coax the peristaltic action.



Removes Constipation, Indigestion. Biliousness and is most useful in all derangements of the Stomach. Liver. and Kidneys.

THE LATE LAWSON TAIT

SAMPLES SENT FREE TO PHYSICIANS

APPLICATION FORM FOR

FREE

OF KUTNOW'S POWDER

To any Member of the Medical Profession.

Address..... Annals of Surgery

Kutnow Bros., Ltd., 803 Broadway, New York, U. S. A.

853 Broadway, New York, U. S. A.

WE MADE ALL the ENGRAVINGS

in this issue of "Annals of Surgery"



Makers of PLATES to print in one or more colors on a type printing press

ANTIPHLOGISTINE

IS NOW THE STANDARD REMEDIAL AGENT

FOR PNEUMONIA, PLEURISY OR BRONCHITIS, PRIMARY OR SECONDARY TO LA GRIPPE OR TO ANY OTHER DISEASE

BECAUSE

- 1.—Antiphlogistine is far more efficient than a poultice or any other external application.
- 2.—Antiphlogistine draws the blood to the surface—bleeds but saves the blood.
- 3.—Antiphlogistine, by reflex action, contracts the pulmonary vessels, thus depleting the lungs into the dilated superficial capillaries.
- 4.—Antiphlogistine's anodyne effects enable it to allay pain.
- 5.—Antiphlogistine relaxes the muscular and nervous systems, thereby tending to induce sleep.
- 6.—Antiphlogistine works persistently and continuously for 24 hours or longer.
- 7.—Antiphlogistine is neat and clean.
- 8.—Antiphlogistine is easily applied and stays exactly where it is put.
- 9.—Antiphlogistine comes off nicely at the proper time, leaving the parts comparatively clean.
- 10.—Antiphlogistine can do no harm and is certain to do good.

IT IS ONLY A QUESTION OF PROPERLY APPLYING

Directions For Applying In Pneumonia.—Prepare the patient in a warm room. Lay him on his side and spread Antiphlogistine thick and as hot as can be comfortably borne over one-half the thoracic walls. Cover with a good, warm, cotton-lined cheese-cloth jacket. Roll the patient over on the dressed side and complete the application. Then stitch the front of the jacket. Prepare everything beforehand and work as rapidly as possible. The dressing should be renewed when it can be easily peeled off, generally in about 24 hours.

To insure economy and the best results always order an original package and specify the size required—Small, Medium, Large, or Hospital Size.

THE DENVER CHEMICAL MFG. Co. NEW YORK.

Seaboard Air Line Railway

SHORT LINE

To and Through

SHORT TIME

FLORIDA

As well as Via

ATLANTA TO SOUTHWEST

The Land of Manatee

on the West Coast of Florida, offers the best opportunity to the TRUCKER and FRUIT GROWER.

Descriptive pamphlets mailed free

Postsmouth, Va.

CHAS. B RYAN, Gen'l Passenger Agt. W. E. CONKLYN, Gen'l Agt. Pass. Dept. Philadelphia, Pa.

Diabetes is of Pancreatic Origin

The Rational Treatment is to supply the Ferment whose Absence is the Cause of Diabetes Mellitus or Glycosuria

togen (Carnrick)

Formula: Trypsin, Ptyalin, Amylopsin, combined 5 grs. Gold Bromide, 1-100 gr., Arsenic Bromide, 1-200 gr.

Is the Most Reasonable Treatment of Diabetes Mellitus and Glycosuria in the Light of Present Knowledge. Tryptogen Meets the Nervous Factor in the Problem with its Gold Bromide and Arsenic Bromide.

For Sale by Druggists, in Tablet Form Only 100 5-gr. Tablets, \$1.25. To Physicians, \$1.00

Prepared by G. W. CARNRICK CO. 28 Sullivan Street, New York



The Winkley Artificial Limb Co.

LOWELL E. JEPSON, M. S.; President. J. H. JEPSON, Secy. and Treas.

JEPSON BROS., (Sole Owners.)

Largest Manufactory of Artificial Legs in the World.



Manufacturers of the Latest Improved Patent Adjustable Double Slip Socket

ARTIFICIAL LEG

With SPONGE RUBBER, Mexican Felt, or English Willow FOOT Warranted Not to Chafe the Stump PERFECT FIT GUARANTEED

From Casts and Measurements WITHOUT LEAVING HOME.



For Ampulation Six Inches Below the Knee.

Thousands of our Slip Socket Legs now being worn. U. S. Government Manufacturers, Send for our New Illustrated Catalogue.

MINNEAPOLIS, MINN., U. S. A.

PLEASE REMEMBER

that, in addition to its beneficial action upon the appetite, digestion and assimilation,

GRAY'S Glycerine TONIC Comp.

stimulates nutrition, enriches the blood, restores vitality. It is the remedy of choice in debility and malnutrition

THE PURDUE FREDERICK CO.,
298 Broadway, New York

Annals of Surgery

Vol. XL

DECEMBER, 1904

No. 6

ORIGINAL MEMOIRS.

ON THE MORPHOLOGY OF CARCINOMA AND THE PARASITIC THEORY OF ITS ETIOLOGY.

BY GEHEIM-MEDIZINALRATH PROFESSOR DOCTOR JOHANNES ORTH,

OF BERLIN,

Professor of Pathology in the University of Berlin.

(Translated from the German of the author's manuscript by PAUL MONROE PILCHER, M.D.)

In complying with the urgent invitation with which I have been honored, I accept the subject of Carcinomatous New Growths as the theme of an address. I cannot offer anything that is new, but it may, however, be of certain interest to hear the views of a pathologist who believes himself to be essentially in accord with the majority of German pathologists concerning two fundamental questions, which are as follows:

- I. In what way is cancer morphologically characterized?
- II. What can be said concerning the parasitic origin of the disease?
- I. With regard to all that the first question involves, there can be no doubt that the characteristic and distinguishing features of the cancer cells are that they are none other than epi-

¹ Read before the Surgical Section of the International Congress of Arts and Sciences, St. Louis, September 23, 1904.

thelial cells. They are epithelial cells not only in accordance with their structure, with respect to the nature of their protoplasm and nuclei, not only epithelium in accordance with their biological activities, but they are also epithelium in accordance with their origin.

There is no metaplasia from connective-tissue cells or cells of that nature into epithelial cells, into cancer cells; it is true that one kind of epithelium can be transformed into another kind, for example, cylindrical cells into squamous cells, squamous cells into cylindrical cells, but an epithelial cell can never be made from a connective-tissue cell, and, *vice versa*, a connective-tissue cell can never be transformed into an epithelial cell.

However, in primary cancer it is difficult to prove the direct derivation of cancer cells from preformed epithelium, for the growth of a cancer is one thing, and its first inception is another. I am, I confess, of the opinion that there are cancers in which the transformation of preformed epithelial cells into cancer cells takes place continuously in the tissue bordering upon the margin of primary tumors, also that there are multicentric cancers, not only in the sense that the cancer change takes place at the same time in different neighboring spots, but also in such a manner that one spot becomes cancerous later than another. However, at the same time, I recognize that many cancers are unicentric, that they have arisen from a single-cell complex only, and possess only an interstitial but no contiguous growth. Formerly, a transformation of preformed epithelium into cancer was generally accepted without further investigation, as soon as a connection between such epithelium and cancer cells was present. That an assumption of this kind is not admissible, Ribbert has justly called attention to, since it is possible for cancerous epithelium to grow somewhere near preformed epithelium and become secondarily annexed to it. One dare not go so far, however, as to attempt to explain in this manner every connection between cancer cells and normal epithelium which one finds on the border or in the immediate neighborhood of a cancer; for by means of serial sections one

can often clearly demonstrate that an isolated deep growth of preformed cells appears, in which, while they closely resemble the mother cells, there is visible at the same time a certain difference. That thereby a particular kind of karyomitosa may be detected similar to the mitosis of the fertilized egg, concerning which I am not as yet entirely convinced, but undoubtedly in connection with this, changes in the condition of cells in regard to pigment do present themselves, as is most easily demonstrated in cancers of the gastro-intestinal tract. Not every appearance of growth in preformed epithelium can be regarded as the beginning of a cancerous change, for there is to be found on the border and in the neighborhood of cancer, just as of other rapidly growing tumors, a multiplication of cells as well as the formation of glycogen, which are only expressions of purely hyperplastic processes; but if a distinct plug-like ingrowth into the underlying tissue with a change of the cell body can be demonstrated, then one can consider it a primary cancerous change.

The origin of cancer cells from preformed epithelium can be recognized with most certainty in the very young cancers, and for this reason the work of Dr. Bormann, Ribbert's assistant, in collecting and carefully examining such cases, was most important. In his work which appeared recently he produces proof for the epithelial origin of the cancer cells in very young primary cancers.

A strong support for the conclusion that all cancer cells originate in regular succession (by inheritance) from preformed epithelium is supported by the secondary cancers of this kind, for they demonstrate, by the innumerable mitoses which the cancer cells show, how vigorously these multiply, so vigorously that the entire growth of these secondary growths can in this way be entirely explained. They demonstrate in the beginning, by the appearance of the first cancer cells in the lymph spaces of the lymphatic glands, by the presence of cancer cells in blood-vessels, that detached cancer cells represent the foundation, the starting-point of new cancerous nodules. It can always be shown by investigation of serial sections, especially

in embolic formation of cancers in the lung or in the liver, that a cancerous exuberant growth in the neighborhood of the vessels always takes its exit from a cancerous growth through the wall. There is no contact infection by way of the tissue surrounding the vessel through the intact wall of the vessel; but a continuous connection between the embolus and the perivascular cancer is always present; the embolus has by uninterrupted increase of its cells grown through the wall into the surrounding tissue.

Of very special importance for the assumption that all the cells of a secondary cancer have arisen from detached cells of an already existing cancer is the suppression of the local cells at the point of the new growth. As one can most easily demonstrate in the case of cancer of the liver, the local cells, the liver cells have nothing at all to do with the new growth of the cancer cells; they remain entirely passive, become displaced by the uninterrupted increase of the cancer cells, atrophy, and finally disappear.

All this goes to prove that the epithelial cancer cells form the essential element of the cancer; but they are not only the most important, but indeed the ONLY important, element. tissue, other than this which is present in the cancer, the stroma, is without any significance for the organization of the cancer. There can be cancerous new growth without this stroma: in the so-called lymph-vessel cancers, that is to say, exuberant growths of cancer cells in the lumen of the lymph-vessels, which are seen in the lung, uterus, and other places, the lymph spaces, or greatly dilated lymph-vessels, for some distance are filled with cancer cells, without the presence of a trace of stroma. In other cancers the local tissue can take the place of stroma; in this manner cancerous growths are found in the lung in which the alveolar net-work immediately takes the place of the cancer stroma; in intravascular or infiltrating cancer of the liver the liver tissue itself, the liver cells with the interstitial connective tissue, forms the cancer stroma. In other cases the cancer stroma is also a new structure, as illustrated most clearly in many cancers of the ductus thoracicus in which the lumen

of the dilated duct contains not only cancer cells, but also a stroma, which is made up of entirely new-formed tissue, but tissue which has developed from the nearest local tissue, namely, from the wall of the vessel. Professor Williams, of Buffalo, investigated such a case at my institute in Goettingen, in which there were present in the stroma also elastic fibres, whose connection with the elastic tissue of the wall of the duct could be satisfactorily demonstrated.

The conclusion to be drawn from all this is that the stroma is an absolutely non-essential, accessory, and unimportant constituent of the cancer, even though in single instances the stroma may have a certain significance in determining the variety or character of the cancer. That, however, a scirrhus in its essentials (characteristics, organization) does not differ from a medullary, soft cancer is very clearly shown from the fact that the periphery or the metastasis of a scirrhus may be throughout of a softer medullary quality.

If, however, according to what has been said, epithelial cells originating in uninterrupted succession from preformed epithelium are the only essential thing in cancer, then from a scientific stand-point, and in accordance with the customary nomenclature, every cancer must be designated as EPITHE-In order to differentiate it from other epithelial new growths, it can be designated as malignant, destructive, or as ABERRANT EPITHELIOMA, the distinction being that in cancer epithelial cells are found in localities where epithelium does not normally exist. Where sharp boundary lines exist in an organ between the epithelial and non-epithelial portions, as in the stomach and intestines, it is easy to establish the aberrancy of the cancer cells; in other places it is especially the occurrence of portions of tissue enclosed within the masses of cancer cells, principally of elastic and collogen (collogenen) fibres, which prove that the cancer cells are present in a place where they do not belong, that as a disturbing element they have crowded into the tissue.

A further consequence of the epithelial nature of cancer is this, that the variety of the cancer must be determined by the special characteristics of the epithelial cancer cells in the particular growth. It is of great significance, therefore, that in every deviation of the cancer cells from the normal epithelium, without exception, in the primary growths as well as in the metastases, there is found to be a definite character in the arrangement and in the morphological as well as the biological character of the cells.

In accordance with this, two groups of aberrant epithelioma may be distinguished:

- 1. Those with typical arrangement of the cancer cells.
- 2. Those with atypical arrangement of the cells.

To the first group belong (a) cancers, which follow the glandular type, adenomata, built up principally from cylinder cells, which form glandular ducts (canals) and complicated glandular structure, and which not infrequently produce a kind of secretion, especially in the stomach and intestines, a slimy secretion. (b) Cancers, whose cells, with respect to form, transformations, and arrangement in strata, are like the epidermis, and which for a long time have borne the name cancroid. It is of special importance for the theory that all cancer cells of the metastatic growth originate from cells of the primary growth, that just as in this first group of cancer, in the adenomata as well as in cancroids, the cells in the metastases show the same form and the same arrangement or transformation and stratification as those of the corresponding primary growth.

The second group is composed of cancers whose cells are placed together irregularly and in masses and patches (strings, cords, etc.), which therefore show an atypical arrangement, whose cells also show fewer distinct peculiarities, of which, however, it can well be said that they differ according to the particular organs in which the parent growth originated. I should like to designate this form of cancer by the word which has for its root the word cancroid, *i.e.*, cancer.

There are many varieties of mixed and transitional forms between these main groups.

II. With these points fixed, we already have a good basis

from which to consider the second question proposed for discussion, *i.e.*, the possible parasitic origin of cancer; for if the primary cancer, with all its metastases, histologically and histogenetically, is nothing more than a great family of epithelial cells, all of which have a common origin from preformed epithelium, then it is not possible for a parasite to be the chief etiological factor, as in the diseases which are known to be parasitic, such as a pus focus or an infectious granuloma. The pus focus is a purely local manifestation, be it either a primary or metastatic pus focus. Tubercular foci, gumma, leprosy, etc., are purely local developments wherever they occur, whether they are primary or secondary foci;; there is never any tissue connection between primary and secondary 'pus foci, between primary and metastatic tubercular growths.

In order to produce pus, or tuberculosis, etc., it is sufficient for the pus cocci, or tubercle bacilli, to reach suitable media; to bring about a secondary cancer, it is absolutely necessary that cancer cells from the primary or from a similarly created secondary tumor shall reach the particular spot, and there continue their growth. In the case of secondary cancers, we have to do with a successful transplantation of cancer cells; in the case of pus foci, or tuberculosis, there occurs a transplantation of the parasites, which do not themselves form the new focus, but they impel the local tissue, without any co-operation of the tissue of the primary focus, to certain pathological changes. Therefore there is an important difference between these two classes of phenomena; and one cannot conclude, that since in the case of pus foci, tuberculosis, etc., parasites play a rôle, this must also necessarily be the case in the carcinomatous new growths; one can, however, say, that if in cancer, parasites should happen to play a part, then these parasites must be of an entirely different kind than those above-mentioned, because they must bear the closest relationship to the cancer cells which characterize the growth. I do not consider it impossible for an intracellular parasite to play a part here; but it is impossible for it to play an independent part. It cannot possibly in itself be the decisive factor in the new growth; it cannot determine

the variety and the character of the new growth, since the cells themselves, and only they, do this.

I hold that the occurrence of such a parasite is not impossible; but how can we establish their presence?

Experiments to prove the power of transmission of tumors from one individual to another cannot in themselves demonstrate anything at all in this connection, for they only deal with transplantation of tissue to another individual. Just as periosteum transplanted to another animal has the power in its new host to grow and to form cartilage and bone; just as, to choose a still more analogous example, epidermis cells may be transplanted to a wound surface of another individual, and there attain a vigorous growth, so it is in the cases of successful tumor transplantation; in this case we have to do with only the production of a secondary tumor, a metastasis; upon a second individual, parasites need play no part whatever.

If it had been possible to produce tuberculosis only through the medium of tubercular tissue, then it could never have been proven that tuberculosis is caused by the tubercle bacilli. Only through the fact that the same result could be obtained by using pure cultures of the bacilli, entirely independent of the tissue elements as by using tubercular tissue; only through the fact that by means of pure cultures of the bacilli primary tuberculosis can be again reproduced in suitable animals; only by means of this could the parasitic nature of tuberculosis be absolutely established.

It is a matter of no consequence etiologically, in proving the transplantability of cancer, to produce a secondary cancer even upon another individual; but it is of consequence to produce a primary tumor. As long as that is not successfully accomplished, and that by means of an organism in pure culture, so long is also the parasitic nature of cancer not proved.

But now there remains one further question to decide, namely this, whether, according to the present state of our knowledge, we must not accept the parasitic origin of cancer. Long before the parasites of the infectious diseases were discovered, there could be no doubt that such must exist, and even to-day such diseases are not wanting. (I mention only syphilis, in which we do not know the parasitic factors, but still do not doubt that they must be present.) Is the case of cancer analogous?

What is to be explained in cancer is the limitless and aberrant growth of epithelial cells. I cannot, and will not here go into an explanation of this problem. The case throughout is not such that a satisfactory explanation can be arrived at through the assumption of parasitic activity, rather that we are in a good position to comprehend all the phenomena in the morphology and biology of carcinoma without parasites.

The following are the conclusions which I have arrived at in respect to the parasitic etiology of carcinoma: (1) No one up to the present time has produced proof that carcinoma is of parasitic origin; (2) There is no necessity to assume a parasitic etiology in carcinoma.

THE PRESENT POSITION OF THE SURGERY OF THE HYPERTROPHIED PROSTATE.

BY J. WILLIAM WHITE, M.D.,

OF PHILADELPHIA,

John Rhea Barton Professor of Surgery in the University of Pennsylvania.

IN 1893, the Annals of Surgery published a paper with the above title, in which I considered the subject under the following headings:

- (1) The nature and chief varieties of the prostatic enlargement and their relation to the vesical changes found associated with them.
- (2) The symptoms in relation to diagnosis and prognosis: (a) subjective; (b) objective.
- (3) The indications for (a) non-interference; (b) medical treatment; (c) palliative treatment; (d) operative treatment.
 - (4) The choice of operation.

I shall briefly, and, for economy of space, without attempting to give detailed reasons, state the views under these respective headings which now seem to me to be entitled to at least provisional acceptance by the profession:

1. As to the essential causes of the enlargement, the existing theories may be summarized as follows:

It has been attributed to (a) the general arteriosclerosis of old age (Guyon); (b) a primary change in the bladder necessitating a compensatory hypertrophy of the prostate (Harrison); (c) a growth analogous to uterine fibromyoma (Thompson); (d) the persistence in an adjunct sexual organ, of physiological activity intended for the control and determination of the masculine characteristics, after the need for such activity had disappeared (White); (e) an attempt to compensate quantitatively for a qualitative deterioration in the prostatic secretion, whose function $(F\ddot{u}rbringer)$ is to determine

the mobility and vitality of the spermatozoa (Rovsing); and, recently, (f) infection (most often by the gonococcus), aggravating a senile degenerative process (Geiger, Crandon); (g) inflammation extending from the urethra to the prostatic ducts and resulting in dilatation of the glandular alveoli (Herring, Daniel). None of these theories has been demonstrated, and some of them are insusceptible of demonstration, but that of Rovsing seems best to explain the shrinkage of the prostate which in many cases follows castration or vasectomy.

The gonococcus theory is sufficiently well supported to justify further investigation on the same lines, although at present the weight of evidence is distinctly against it. Some very interesting clinical facts may become explicable in the light of this theory if it should—as seems unlikely—receive confirmation. For example, Rovsing has recently reported five cases of double castration. In three, with no previous history of gonorrhæa, the results were extremely favorable. In a man of eighty-five, who had had total retention for eleven years, spontaneous evacuation of the bladder followed within six weeks; the other two, aged sixty-four and seventy-six, were alive and entirely well six years later. The two cases that showed no improvement had had gonorrhæa.

It is obvious that, as regards both prognosis and treatment, it is most desirable that we should discover the cause of prostatic hypertrophy. If the enlargement is merely one symptom of a general or constitutional condition, or if it is secondary to precedent changes in the bladder-walls, it would seem that much less could be expected from treatment than if it is dependent on causes at present unknown, but which may be said to be inherent in the structure or in the functional condition of the gland itself, or to be infective in character. If the changes in the bladder-walls and the accumulation of residual urine are the result of the precedent prostatic disease, treatment of the latter, if early and judicious, offers much more prospect of success. There is at present no reason to doubt that the vesical changes and symptoms are caused by (1) the

mechanical obstruction which the enlarged prostate offers to the ready and complete evacuation of the bladder; (2) the circulatory disturbance incident to pressure on the prostatic veins into which the blood from the vesical veins passes, and (3) septic infection.

- 2. In prostatic symptomatology nothing new that has any important bearing on diagnosis or prognosis has been added to our knowledge during the last decade.
- (a) The subjective symptoms excited by prostatic hypertrophy may still be summarized as follows: Undue frequency of urination, especially at night; difficulty in starting the stream; feebleness of the stream; interrupted urination; urinary incontinence; retention of urine; changes in the urine; sensory disturbance; constitutional symptoms. They are all due to pressure of the enlarged prostate on surrounding parts, to obstruction of the prostatic urethra, and to inflammatory, atrophic, or degenerative changes resulting from this obstruction.
- (b) The objective symptoms are still elicited by measuring the quantity of residual urine, by digital exploration through the rectum, and by such instrumental examination as will determine the length of the urethra, the seat, nature, and degree of the obstruction, the tonicity of the bladder, and the condition of the ureters, of the renal pelves, and of the kidneys themselves.

While progress has undoubtedly been made of late years in the simplification and improvement of many urethral and vesical instruments (especially of the cystoscope), no fundamental change has occurred, and it is still possible in the majority of cases to reach a sound conclusion as to the above points by a careful study of the history, and of the urine, and by the aid of catheters, vesical searchers, and the finger.

3. In considering the indications for treatment, the classification of cases of prostatic hypertrophy is of interest. It is well to determine (a) the predominant character of the growth, whether soft, indicating excess of glandular and muscular elements; or hard, showing advanced fibroid change. The dis-

tinction can be made more simply and accurately by rectal palpation than by any other method; (b) the seat of the growth, median, lateral, or general; (c) the presence or absence of general arteriosclerosis; and (d) the condition of the vesical mucosa and of the upper urinary tract as to pyogenic infection.

The last of these is the most important in its relation to the choice between expectant or palliative and operative treatment, and to prognosis.

- 4. As to the various possible plans of managing a case of prostatic hypertrophy, it may be said:
- (a) That a purely expectant treatment is proper only in those cases (usually discovered during a rectal examination made for other purposes) in which the enlargement has produced no symptoms, catheterism is easy, and there is no residual urine.
- (b) That no medical treatment is worthy of consideration except as, by means of urinary antiseptics, it may tend to prevent or mitigate the occurrence of infection.
- (c) Palliative treatment still consists, as it did ten years ago, in either the systematic use of steel sounds or other instruments for purposes of dilatation, or in the employment of the catheter, and is still of value in a considerable number of cases. As to this important matter, after ten years' additional experience, and after carefully reviewing the literature, I believe the tendency of the profession should be-as it is-towards earlier operation, and that palliation—dilatation or catheterism—should be carefully restricted, and its effects watched with scrupulous exactness. There can be no doubt that the danger resulting from the pressure of residual urine in moderate quantity, while real. is less than that due to infection. If infection arose only from instrumentation, the use of the catheter might be properly delayed (when more radical measures are declined) until the residual urine was in quantity sufficient to begin to affect the general health by causing great frequency of urination, by backward pressure, or in other ways. As, however, infection occurs in many cases without previous instrumentation, as it is greatly favored by the congestion incident to retention, and as

the atrophic, ureteral, and renal changes from backward pressure are often unrecognizable in their early stages, and practically incurable later, the following rules as to dilatation and catheterism seem still to be applicable to some early and mild cases, and to many others in which, for any reason, operative treatment cannot be employed:

Dilatation.—A patient who presents the symptoms of the prostato-vesical congestion of the early stages of hypertrophy, who is disturbed once or twice at night, who has an enlargement of moderate density, appreciable through the rectum, but not offering much resistance to the introduction of an ordinary catheter, and who has but little residual urine, is likely to derive great benefit from the systematic introduction of full-sized steel I have always under observation a number of such patients in whom this treatment, and this alone, seems to relieve existing symptoms and to prevent, or at least delay, the development of further trouble. That it can have any true curative effect is unlikely; that it can even modify to any extent the continuous enlargement of the gland seems improbable, but that, either by producing a local atrophy in the parts immediately surrounding the urethra, or by simply stretching the canal itself and relieving local congestion and tumefaction, it mitigates the early symptoms, lessens the vesical irritability, diminishes the amount of residual urine, and modifies favorably the whole course of the case, seems to me beyond all doubt.

Catheterism should be systematically employed in cases in which the quantity of residual urine is three or four ounces or more, and in which the introduction of the instrument is easy and painless, and the urine is sterile. The frequency should be proportionate to the amount and character of the residual urine; a very good working rule (if the urine is sterile) being to use the catheter once daily (preferably at bedtime) for three ounces, twice for six ounces, and then once more for any additional two ounces. With sterile urine it is rarely necessary to use it oftener than once in every four hours.

The objections to habitual catheterism in prostatics are: (1) the risk of vesical infection; (2) the production of vesical

atony. These are very real and very serious, although not sufficient to contraindicate the employment of the method. The first may often, but not always, be avoided by scrupulous and unflagging care as to asepsis. The second is unavoidable, and this fact should be regarded as weighing in favor of operation in all cases where it comes up for consideration.

(d) Operative treatment should now be regarded as distinctly indicated whenever a progressive prostatic hypertrophy exists, or when, even in patients with but moderate obstruction, good compensatory hypertrophy of the bladder and a small amount of residual urine, catheterism is becoming more painful or more difficult, the urine shows fermentative changes, and the vesical congestion is passing into a true cystitis. -These indications become more definite and more urgent in almost direct proportion to the duration of the prostatic symptoms and to the age of the patient.

As distinct advance in operative methods has been made during this decade, and as we can offer to the average patient both greater hope of full relief and lessened risk, these indications, which are substantially those mentioned in 1893, should, in my opinion, be still further emphasized and insisted upon for the reasons that I then gave, viz., because, on the one hand, it is just at that period of the case when operation is for the first time clearly indicated and justified, and, on the other hand, that it promises most.

5. As to the choice of operation, it does not seem to me necessary to consider such methods as the injection of iodine, ergotin, or carbolic acid; the application of a continuous current through the negative pole inserted into the body of the gland through the rectum, the positive pole being applied to the abdomen; the application of the galvanocautery to the mucous membrane of the prostatic urethra by means of instantaneous flashes; the division of the bar at the neck of the bladder by means of a cutting instrument inserted through the penile urethra; the overstretching of the prostatic urethra; or the ligation of the internal iliacs. They were merely mentioned in 1893. They scarcely require mention now.

The section at the neck of the bladder by means of the electrocautery (Bottini) and its modifications, such as galvano-prostatomy (Chetwood), should in fairness be regarded as still on trial. The number and the professional position of their advocates render impossible the summary dismissal of these methods as unworthy of consideration. While I never mention them to my patients as among the alternatives presented to them, I recognize their theoretical advantages and await their satisfactory clinical demonstration. As I said in 1893: "It may be that some of them contain the germs of what is destined to be the approved and successful treatment of the future. At present, however, the evidence points in the contrary direction."

The remaining methods of treatment that are to be considered are (a) those directed to procuring shrinkage of the prostate by operations on the sexual apparatus (castration, vasectomy); and (b) the direct removal of the enlarged gland (prostatectomy).

(a) Doubtless many surgeons, probably most surgeons, would to-day dismiss castration and vasectomy from consideration as summarily as I have rejected interstitial injection or transrectal galvanism. It may be that they are entirely right. It was in the paper which I have taken as a basis of comparison in preparing this one—an address before the American Surgical Association—that I first suggested castration as a possibility in the treatment of prostatic hypertrophy. Ramm, of Norway, appears to have had the same idea at about the same time, but to have published nothing until later. Doubtless others had thought of it more or less vaguely, but no one seems to have tried to test its value experimentally as I had done previous to laying it before the profession.

As this is an "anniversary" number of the Annals, and is with propriety somewhat historical and retrospective in its character, I may be pardoned for quoting two or three sentences that indicate my own mental attitude at that time. I said towards the end of the paper: "I have one further thought which I have decided to mention to this Association, although I do so with a reluctance born of the fear of being considered

illogical or impractical, or perhaps both." I then went on to recall the well-known theory as to the analogy between uterine fibromyomata and prostatic overgrowth, the effect of oophorectomy on the former, the testimony as to the infantile character of the prostate in eunuchs, the observations of John Hunter and Griffiths upon the prostates of the mole, the hedgehog, and the bull, and finally described the results of the experimental castration of dogs (Kirby)—with control experiments—in the following words: "These results, which I believe may be relied upon, place beyond all peradventure the influence of castration (in the dog at least) upon the condition of the prostate. and show clearly that the operation is followed invariably, and with a promptness which I must confess was to me surprising, by atrophy first of the glandular and then of the muscular elements, and by a coincident reduction in both bulk and weight." After discussing the possibility of making these facts a basis for the employment of castration in prostatic hypertrophy, I said: "I do not desire to be understood as insisting upon the truth or even upon the probability of the above hypothesis. I have simply, with much hesitation, determined to follow out publicly a line of thought that had occupied my mind at odd times, and to submit it to your criticism;" and added: might admit, finally, that I have not had the courage of my convictions, and have never seriously sought to recommend the operation, but it would be truer to say that I have as yet no definite convictions, and that I am simply seeking enough light upon the subject to convince me either that it is worth pursuing further, or, on the other hand, that it offers no possibility of practical usefulness."

Even with so cautious a presentation of the subject, however, the operation was taken up all over the world with great rapidity, and large numbers of patients were subjected to it, some of them, as the reports show, already moribund. Many cases were operated upon and the immediate results published before I had myself found what I regarded as a case suitable for this procedure.

I had spoken of the operation as one "with a low mor-

tality," and so conservative a surgeon as Lord Lister, in commenting on my paper, remarked that I should have said "with no mortality." I was disappointed to find that a very considerable mortality was reported. It was true that the majority of the deaths were obviously in spite of, not because of, the operation. Still, the death-rate was larger than any one had anticipated. Two years later (July, 1895) I was able to gather from surgical literature and through correspondence, and to report in the Annals, a series of III cases that had been operated upon. The deaths were twenty, thirteen of which I thought should be excluded in an attempt to arrive at the legitimate mortality, as they had occurred in cases that were obviously at the point of death when operated upon. Still, even with this exclusion—which was not assented to by the critics of the operation—the remaining mortality of 7 per cent. was greater than I had anticipated.

A glance at that paper with its table of cases will show apparently (according to the reports of surgeons from all countries in the world) that in about 85 per cent. of cases such diminution in size of the prostate had rapidly followed the operation that it was thought to be analogous to, or identical with, the atrophy I had experimentally shown to occur in dogs; that long-standing cystitis had disappeared or greatly lessened in more than half the cases; that distinct amelioration of the most troublesome symptoms had occurred in over 80 per cent. and a return to local conditions not very far removed from normal in 46 per cent. of those operated upon.

At this time I felt hopeful as to the future of the operation, and defended it to the best of my ability, on the basis of these clinical reports of actual cases. I was doubtless too easily convinced, as, judged by their reports, were many other surgeons, and perhaps my defence was often—as is not uncommon in controversial literature—somewhat too vigorous; but by the end of 1896 I said (Annals of Surgery, Vol. xxiv, page 398) that I would be quite content if nothing better could ever be said of the operation than Dr. Arthur Cabot (who had been a keen and thoughtful critic from the beginning) said would

be justified by the then existing statistics if further experience confirmed them, viz., "We shall be able to express the facts thus to our inquiring patients: You have eight chances in ten of getting through the operation all right, and if you are successful in this, you have again eight chances in ten, or a little better, of getting very substantial relief from your urinary difficulties."

In 1900, Dr. Alfred Wood published (Annals of Surgery, Vol. xxxii, page 309) a collection of 159 cases of castration, and 193 cases of vasectomy, none of which had been included in my table of 1895, or in Cabot's table of 1896. The reported results of the castrations showed thirteen deaths (a little over 8 per cent. of mortality), and with some variations corresponded approximately to the results shown in the earliest table. In the vasectomies the mortality was 6.7 per cent., and in 67 per cent. some form of general improvement was noted.

In the same year (1900) Mr. Reginald Harrison reported more than 100 cases of vasectomy, and said that he had been able to observe "benefit of some kind and in some degree in almost every case, although the accompanying conditions often prevented anything like a cure."

In 1902, Rovsing reported forty cases of vasectomy, of which twenty-seven were cured, nine relieved, and four unimproved. There were no deaths. He adds: "I should under no circumstances feel myself justified in undertaking the total extirpation of the prostate in a patient in whom I had not done a vasectomy, which in many cases gives such extraordinary relief."

Since then no notable papers on this subject have been published. I may be pardoned for adding that during the decade during which this evidence has been accumulating I have in my own practice—including both private and hospital patients—found but fifteen cases in which I thought castration justifiable, and thirty-seven cases in which I have performed vasectomy. I mention these figures merely to indicate that I have tried to preserve the conservatism with which I suggested the operation originally.

My present opinion is that castration and vasectomy are

likely to occupy a more and more restricted field in the treatment of prostatic hypertrophy. In properly selected cases I still think that they are likely to have a low mortality, and that when fully successful they secure a return to a condition more closely resembling the normal than most of the other operations looking towards a radical cure of the hypertrophied pros-They certainly cannot, however, be said to be gaining ground in the favor of the profession. Although in the several hundreds of reported cases the outcome seemed in the majority of instances to be satisfactory to the operators, these procedures have been gradually given up in favor of various others more recently advocated. The uncertainty of their results, both immediate and remote; the fact that they are not free from danger; and, so far as castration is concerned, the strong and not unreasonable sentimental objections to it, combine to render their final status in the treatment of prostatic hypertrophy a matter of doubt. It may be that a better classification of prostatics in accordance with their clinical history will resolve this doubt.

In the meanwhile, without the least disposition to urge these operations upon the profession, or to claim anything for them which facts do not justify, I would suggest that they still merit at least occasional consideration; that not all of the published reports of successes can be inaccurate or misleading; that such testimony as Harrison's or Rovsing's should not lightly be ignored; and that it is quite possible that there may still be a definite field of usefulness for these procedures, although I now believe that it will be much more limited than I at one time thought it would be.

(b) My opinion as to the greatly—and justly—increased limitations of these operations in the future is much influenced by the improvement, to which I have already alluded, in the method of performing prostatectomy.

Largely through the work of one surgeon, Mr. P. J. Freyer, suprapulic enucleation of the entire gland has during the last decade become the operation of choice in the majority of cases. He opens the bladder in the usual way, having intro-

duced and left in situ a hard-gum catheter. He scratches or scrapes through the mucous membrane over the prominent portions of the prostate, which, he says, will usually be found by pressure to have so thinned the fibrous sheath formed from the pelvic fascia that the finger comes down on the true capsule of the prostate. This is deficient along the upper and lower commissures or bridges of tissue that unite the lateral lobes above and below the urethra. These lobes are separate in early fœtal life, and tend to revert to this condition and become more distinct when hypertrophied. Accordingly, it is possible, by following the capsule closely with the finger, to enucleate the whole prostate, usually leaving the urethra intact, and sometimes even the ejaculatory ducts. The prostatic plexuses, which lie between the fibrous sheath and the true capsule, are left behind, and the hæmorrhage is therefore trifling. During the procedure the prostate is steadied from beneath, through the rectum, by the fingers of the operator.

The greater simplicity, lessened risk, and more satisfactory results claimed by Mr. Freyer for this operation, as compared with previous methods of prostatectomy, have been demonstrated by his own published experience, and by those of the many surgeons who are now beginning to record their testimony. Up to July of this year, Mr. Freyer had done "total enucleation" in 110 cases, the patients varying in age from fifty-three to eighty-four years, the average age being a little over sixty-eight years, and the prostates weighing from threequarters of an ounce to fourteen and a quarter ounces, with an average weight of three and a quarter ounces. The majority of the patients had been entirely dependent on the catheter for varying periods extending up to twenty-four years. Nearly all of them were in broken health, and many were apparently moribund when the operation was undertaken. The great majority of them were said to be "reduced to such a wretched condition that existence was simply unendurable." Few of them were free from one or more grave complications, such as cystitis, stone in the bladder, pyelitis, kidney disease, diabetes, heart disease, thoracic aneurism, chronic bronchitis, paralysis, hernia.

hæmorrhoids, etc. This is, of course, a summary of the unpromising conditions recognized by every surgeon as those under which the operation must usually be undertaken.

In three of the cases the disease was malignant. One of these died, the other two recovered. Excluding these three, there were left 107 cases of complete removal of the prostate for adenomatous enlargement, ninety-seven of which were "successful." Mr. Freyer defines "success," as he uses the term, as meaning that the patient regains the power of retaining and passing the urine naturally, without the aid of a catheter, as well as he ever did. He adds: "In no instance has the patient failed to regain the power of voluntary micturition without the aid of a catheter. There has been no instance of relapse of the symptoms; on the contrary, lapse of time only seems to consolidate the cure. In no case has there been contraction at the seat of operation leading to stricture; nor has there been any instance of a permanent fistula remaining."

Of the ten deaths, he thinks that four, or at most five, can be attributed to the operation itself, and that the remainder were due to diseases incident to old age. This seems to me, as I have always contended, a fair way of estimating the risk of a new procedure, or a procedure that is new as applied to a given condition. It would give in his series of cases a mortality of less than 6 per cent. But, accepting all the deaths as having relation to the operation, the mortality is only about 9 per cent., which, considering the precedent condition of the patients, is extraordinarily small. Mr. Freyer says that if the operation were undertaken in selected cases only-cases in which the general health was unimpaired—the mortality might be still further reduced; but I agree with him that any such restriction would be unjustifiable, as it would have the effect of excluding the great majority of the patients who at present seek relief from this operation. I agree, too, with Mr. Freyer that, as the operation becomes more widely known and more popular, patients will no doubt seek relief at an earlier period of the disease, whilst their constitutions are sound and with a much greater prospect of success; and that increased experience in

operating, improvement in the details of the after-treatment, and better nursing, are all factors that will tend to reduce the death-rate.

My own personal experience with the operation tends to confirm all of Mr. Freyer's claims.

The anatomical discussion as to the possibility of "total enucleation," as to the presence of a "true" capsule, as to the retention of the uninjured prostatic urethra, etc., has been and is interesting, but the clinical results of the operation make such discussion seem of academic rather than practical importance.

As to the other methods of prostatectomy,—the perineal, the "combined," etc.,—there can be no doubt that they have often given good results in the hands of some surgeons, and are still the methods preferred by a number of able workers in this field. There are probably cases for which they will always be found specially suitable, but at present it appears to me that such cases will be exceptional, and that past experience does not justify the expectation that the results of prostatectomy by the perineal route will compare favorably with those of the "total enucleation" above described.

INTUSSUSCEPTION OF MECKEL'S DIVERTICULUM.

REPORT OF A CASE COMPLICATED BY STENOSIS OF THE INTESTINE BELOW LEAD-ING TO SECONDARY INTUSSUSCEPTION OF THE SMALL INTESTINE.

BY W. WATSON CHEYNE, C.B., F.R.S.,

OF LONDON,

Surgeon to King's College Hospital.

THE following case is worth recording on account of its extreme rarity:

The patient, G. W., aged nineteen years, billiard-marker, was admitted into King's College Hospital on March 12, 1904. The patient gave a history of indefinite abdominal discomfort lasting for about two years, which culminated in an attack of vomiting and diarrhæa in July, 1903. This attack was followed by others at intervals of about a couple of weeks. The usual history of these attacks was that the abdominal discomfort, flatulence, etc., increased until vomiting occurred. The amount vomited was copious, of a greenish or yellowish character, and its ejection was followed by marked relief. The attacks had of late increased in frequency until they occurred about once a week. His previous history was unimportant, except that when a child he was said to have suffered from "consumptive bowels."

On admission the patient was fairly well nourished, pale, with dry lips, but without any distinct anxious expression. The abdomen moved normally on respiration, was only very slightly distended, and, with the exception of a spot about an inch and a half below the umbilicus in the middle line, there was no tenderness. In the left iliac region there was a tympanitic note on percussion, and a good deal of gurgling could be felt in this region. Nothing could be made out per rectum. The temperature was normal.

On March 16 the patient had his first attack of vomiting in the hospital, about two pints of semiliquid material being brought up. The vomit contained about 65 per cent. of hydrochloric acid, but was not otherwise abnormal. Since admission there had been 706 no rise of temperature, and the bowels had acted twice daily without any aperient.

On March 19 he complained of a good deal of flatulence and abdominal pain. About mid-day the pain became more acute, being referred to the epigastrium, and a distended loop of bowel appeared in the left iliac region. This was tender, but quickly disappeared on being touched. In the afternoon the patient vomited about twenty-eight ounces of fluid and the symptoms were relieved. Later, however, the relief afforded by the vomiting passed off, and the patient was again in great pain. Another loop of bowel could be seen just below and to the right of the umbilicus; this again rapidly disappeared on being handled, and its disappearance was accompanied by a distinct gurgle. resonance of the left iliac region was impaired and an indefinite lump could be felt there. Later in the evening the patient had another attack of pain more acute than the first; there was again vomiting,-sixteen ounces,-and the bowels were moved, the motion containing mucus but no blood. Indeed, no blood had been passed per rectum at any time.

The next day, March 20, the patient was more comfortable in the morning, but in the evening the pain returned. There was again a distended coil of intestine to be seen, and voniting also occurred; but on this occasion the pain was not relieved by it. There was still impaired resonance in the left iliac fossa. The pain was distinctly colicky and was very severe. It was relieved by a subcutaneous injection of morphine. The pain continued to come on in spasms during the 21st, and a rounded, soft swelling could be felt just below the umbilicus, which became distinctly harder when the spasm of pain came on. The vomiting persisted.

The following day, March 22, the patient became much more exhausted, but the vomiting had ceased. The pain was just the same as before and of a colicky character, but there was no abdominal rigidity.

March 23. The abdomen was opened in the middle line, the umbilicus being about the centre of the incision. A coil of distended and much congested small intestine presented itself. On further examination a large intussusception was found lying in the pelvis. The mass was brought out of the abdomen, sterilized cloths were packed around, and the intussusception, which was about eighteen inches long, was easily reduced, there being no lymph nor any tendency to adhesion at all. When it was reduced, a second intussusception presented itself, and this again was easily squeezed out, and there were no adhesions between the intussusceptum and the intussusception. A mass was now felt, in which there was again an intussusception to be noticed, which could not be reduced, and the whole mass was so inextricably involved that it seemed best simply to excise it. The intestine was therefore cut across above and below, both ends were stitched up, and a lateral anastomosis was made. The upper portion of the bowel was so enormously dilated as compared with the lower that an end-to-end union did not seem likely to be satisfactory. The piece of bowel involved was the small intestine. Its exact position above the ileocæcal valve was not ascertained, but I should think it was from two to three feet above.

The patient was severely collapsed after the operation, and there was a considerable amount of colicky pain and rather trouble-some nausea. However, the patient very soon improved, and on March 26 the note is that "The patient's condition is much improved; he has begun to take small feeds by the mouth in addition to rectal feeding, and has lost his pain." From this time onward the patient progressed without any bad symptom. The wound healed by first intention, and by the time he left the hospital, on May 11, he had completely recovered, felt well, and was rapidly gaining in weight, having made nine pounds in the last fortnight.

Description of the Portion resected.—The lower part (E) (Fig. 1) consisted of small intestine, which had apparently formed the apex of the second intussusception. It had evidently been constricted; its mucous membrane was smooth and covered with villi; but there were no traces of any valvulæ conniventes, and there were only slight rugæ towards the upper end. About an inch of this portion of the intestine had been cut off.

At the upper end, the lumen of the bowel rapidly narrowed till there was only a narrow channel (C) connecting this portion (E) of the intestine and the distended upper portion (A). This channel was lying at the border of the mesentery. It was about two and one-half inches long; it was about the caliber of a goosequill; the wall of it was thickened and composed of scar tissue, and it was for the most part apparently devoid of mucous membrane. This narrow canal joined the intestine above (A), which

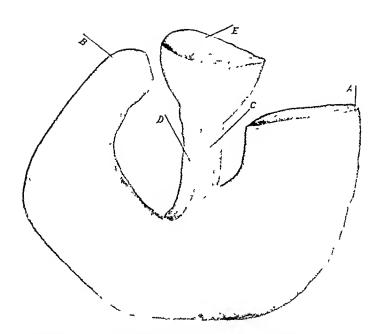


Fig. 1.—A, Upper part of bowel; B, diverticulum pulled out, C, narrow tube connecting the upper and lower parts of the bowel; D, mesentery; E, lower part of bowel.

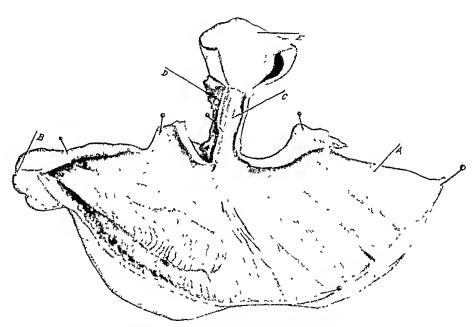


Fig. 2—A, Upper part of bowel; B, diverticulum inverted; C, narrow canal connecting the upper and lower parts of the bowel; D, mesentery, E, lower part of bowel.

was enormously dilated. From the point of junction, the intestine on the one side ran upward and was continuous with the intestine above, which was enormously dilated; on the other side of the attachment of this canal there was an abnormal diverticulum which was invaginated. The diverticulum when pulled out was four inches long. It was conical in shape with smooth peritoneal walls. Its inner surface showed a ridge which corresponded to the mesenteric attachment. (Fig. 2.) This diverticulum (B) was filled up by a pyriform structure consisting of the intussuscepted swollen terminal portion, the end of which hung into the distended upper portion of the intestine. This projection consisted mainly of mucous membrane and submucous tissue, but at the outer part the serous membrane was also invaginated for about an inch: a probe could be passed into the pedicle of the diverticulum from the peritoneal cavity. The mucous membrane covering it was normal and covered with villi and valvulæ conníventes. The whole of the structures described, namely, the distal portion of the bowel just below the constricted part, the constricted portion itself, and the diverticulum, had been invaginated into the portion of bowel below, the apex of the intussusceptum being formed by the bowel just below the stricture.

The case is clearly one of an intussuscepted Meckel's diverticulum, and, like several of the cases of this condition which have been published, it is essentially the mucous membrane which is invaginated. The case, however, differs from those published, with one exception (Ewald's No. 13), in that there is a narrow strictured canal connecting the upper and lower portion of the intestine. As to the origin of this canal, I should think that it is most probably a congenital stricture of the small intestine. Congenital strictures of the small intestine have been described as occurring along with and at the point of attachment of a Meckel's diverticulum, and probably this strictured portion had become narrower of late on account of sloughing of the mucous membrane. Against this view may be urged the fact that the patient for seventeen years had given no indication of having anything wrong with his intestine, but it is quite possible that the stricture had become tighter of late: in

fact, this is highly probable, seeing that some inflammatory process had been going on leading to disappearance of the mucous membrane and thickening of the walls, and thus the stricture may have become so much narrower as to interfere with the proper passage of the intestinal contents. It is probable, also, that the occurrence of the intussusception of the Meckel's diverticulum had increased the trouble, the end of the intussuscepted portion lying like a valve over the orifice of this narrow canal. I should think that the train of events probably was that the patient had a Meckel's diverticulum, and had a fairly narrow congenital stricture of the intestine; that the discomfort to which the latter gave rise was comparatively slight, and the patient had become so accustomed to it that he did not notice anything abnormal; that inflammation of the mucous membrane of this strictured portion occurred, leading to swelling and increased obstruction; and that, as the result of the efforts of the intestine to overcome the obstruction, the Meckel diverticulum itself had become invaginated; that, once this had taken place, the end of the invaginated portion lay like a valve over the opening of the congenital stricture, and thus increased the obstructive troubles; and then, as the result of the violent and constant peristaltic action, the affected portion of the intestine, namely, the diverticulum and the stricture, had become invaginated into the intestine below. The invagination had not been so tight as to interfere with circulation; hence there were no adhesions between intussusceptum and intussuscipiens. The curious condition of the original intussusception having become again invaginated into the bowel below was probably of recent occurrence.

On searching the literature, I find reference to sixteen cases of intussusception of a Meckel's diverticulum; but in only one of them (Ewald's) do I find mention of a stricture as well. Seven of these cases were collected some years ago by Küttner (see Beiträge zur klinischen Chirurgie, Vol. xxi, 1898), and Halstead, in the Annals of Surgery, Vol. xxxv, 1902, in a paper on troubles connected with Meckel's diverticulum, gives a list of cases in which I find several in which in-

vagination of the diverticulum had occurred. In his paper he states that twelve cases in all had been reported. Other isolated

cases have also been published, making with this case of mine seventeen in all.

Two views have been expressed as to the mode in which invagination of the diverticulum takes place. Küttner looks on its occurrence as due to active peristaltic action on the part of the diverticulum itself: in one of his cases this was set up by a polypus, in another by the presence of an accessory pancreas. In other cases where the etiology is not clear, Küttner thinks that the diverticulum becomes filled with fæcal matter, and in the peristaltic efforts to dislodge it invagination takes place, and once this has occurred the peristalsis is increased and the invagination rapidly progresses. De Quervain thinks that the invagination occurs in a passive manner, namely, that the rapid flow of the intestinal contents past the orifice of the diverticulum produces a negative pressure in the diverticulum, and thus draws it into the intestine. I must say that I can hardly think that the latter view is a likely one.

In most of the cases it is noted that it is chiefly the mucous lining of the diverticulum which has become invaginated, probably due to the loose attachment of the mucous membrane. Of course, once the diverticulum has become more or less inverted into the bowel, the subsequent occurrence of intussusception of the intestine is quite a natural result. It may, however, be noted that in a number of cases only the diverticulum has been found invaginated without any intussusception of the intestine. Hohlbeck found that in twelve published cases there was intussusception of the diverticulum alone in five, and in seven, intussusception of the intestine as well (four times iliac, once ileocolic, and twice ileocæcal).

The following is a list of all the cases published, including those collected by Küttner and Halstead:

1. Hohlbeck. (Archiv für klinische Chirurgic, Vol. lxi, 1900.)—Female, aged nineteen years. Severe pain in the abdomen and obstructive symptoms three days before admission. Sausage-shaped tumor felt in the ileocæcal region. Abdomen opened on the outer side of the right

rectus. Ileocæcal invagination found; reduced, and then an abnormal Meckel's diverticulum found, which was removed. Patient died two days later. On examination the mucous membrane lining the diverticulum was separated from the muscular coat and invaginated, forming a floating tumor in the lumen of the intestine.

- 2. Wainwright. (Annals of Surgery, Vol. xxxv, 1902.)—Male, aged seventeen years. Six days before admission, failure of appetite, sense of fulness, constipation. Worked for five days. Then severe pain in epigastrium and complete obstruction and vomiting. No tumor. High oil enema given, but returned with blood only. Abdominal section. Eight ounces of clear serum in the peritoneum. Sigmoid and cæcum empty. Intussusception three inches long, about three feet from the ileocæcal valve. Invagination easily reduced; no adhesions. It was then found that there was a diverticulum which was itself inverted, the inverted apex of it evidently forming the apex of the intussusception. Easily reduced; the diverticulum clamped and cut away. Recovery uneventful.
- 3. DE QUERVAIN. (Centralblatt für Chirurgie, 1898.)—Male, aged sixteen years. Seized suddenly with violent abdominal pain and vomiting. Repeated action of the bowels. No diagnosis made. Laparotomy. Foul-smelling bloody fluid found and an intussuscepted piece of small intestine. Gangrene had occurred at the neck of the intussusceptum. Resection of the intussuscepted portion, which was ten centimetres long, and an artificial anus formed. Death in a few hours. On opening the invagination, a polypoid structure about five centimetres long was found somewhat swollen at its end. This was an inverted diverticulum.
- 4. STUDSGAARD. (Centralblatt für Chirurgie, 1894, quoted from De Quervain.)—Male, aged thirty-seven years; admitted with peritonitis and intussusception of the ileum; laparotomy; resection; death. The intussusception was found to be caused by an invaginated diverticulum.
- 5. Brunner. (Beiträge zur klinischen Chirurgie, Vol. xxv, 1899.)—Patient aged four years. Seized suddenly with abdominal pain three days before admission. Passed blood afterwards. No proper action of the bowels. Diagnosis of intussusception. Laparotomy. Ileocæcal intussusception found. Irreducible. The portion resected. Patient did well. Resected portion measured twenty-two centimetres. On looking into the cæcum, a bell-like, firm tumor was seen to be hanging into it; it was somewhat pear-shaped and bent towards the mesenteric side; it had a pedicle attached to the small intestine. The surface of the tumor covered with mucous membrane. On further examination an accessory pancreas was found on the serous side of this projection covered with a fold of fat. This had apparently led to the invagination. The case was therefore an accessory pancreas at the blind end of a true diverticulum of the intestine. As the result, invagination of the diverticulum, and subsequently invagination of the ileum through the ileocæcal valve.
- 6. Von Stubenrauch. (Centralblatt für Chirurgie, July 2, 1898.)—Girl, aged five and a half years. Acute seizure, bloody stools, colic, diarrhœa, etc., five days before admission. Sausage-shaped tumor. Laparotomy performed. Intussusception ten centimetres above the ileocæcal

valve. Intussusceptum gangrenous. Death two hours later. In addition to the intussusception of the small intestine, there was an inverted Meckel's diverticulum.

The following four cases are taken from Halstead's paper (Annals of Surgery, Vol. xxxv, 1902):

- 7. ROBINSON. (British Medical Journal, 1899, Vol. ii.)—Male, aged five years. Acute pain referred to umbilicus; abdominal distention; tumor on the right side of abdomen. Diagnosis, intussusception. death two hours later. Invagination of diverticulum and intussusception of the small intestine as well.
- 8. Adams. (St. Bartholomew's Hospital Reports, 1891.) Male, aged forty-two years. Symptoms obscure, rather chronic. Evidence of obstruction lasting two weeks. No operation. Death. Invagination of diverticulum and ileocolic intussusception.
- 9. Adams. (St. Bartholomew's Hospital Reports, 1891.)—Male. clinical history. At autopsy, intussusception of diverticulum.
- 10. WEILL ET FRAENKEL. (Bull. de la Soc. de Anat. de Paris, 1896.)-Female, aged four years. Acute ileus, one day's duration. Invagination of diverticulum and ileum. Resection of intestine; suture. Death.

The remaining cases are from Küttner's paper in the Beiträge zur klinischen Chirurgie, Vol. xxi, 1898:

- 11. KÜTTNER. (Beiträge zur klinischen Chirurgie, Vol. xxi, 1898.)-Female, aged forty-nine years. Symptoms of acute obstruction for three days. (Similar attack eight weeks previously, which passed off suddenly Laparotomy. Pus in the pelvis. after five days.) Great distention. State of matters not made out. Pus sponged out. Anastomosis between dilated intestine above and collapsed intestine below. Death. On examination, polypus-like structure found in the intestine about seven centimetres long, which proved to be a Meckel's diverticulum invaginated and projecting into the small intestine. It was situated about ninety centimetres below the commencement of the jejunum. In the middle there was gangrene of all the layers of the small intestine and three minute perforations.
- 12. MARONI.-Man, aged twenty-six years. Intestinal obstruction. Abdomen opened. Found torsion of small intestine, which was rectified; but patient died. Post-mortem: a second complete obstruction in the lower part of the ileum due to a Meckel's diverticulum inverted into the lumen of the bowel. The invagination was caused by a polypus in the diverticulum.
- 13. EWALD.—Female, aged forty-two years. Has had several attacks of violent pain in the abdomen, constipation, and vomiting, from which she recovered. She died in the last of these attacks. It was found that there was a Meckel's diverticulum which had become invaginated into the

intestinal canal. In addition there was a stenosis of the intestine scarcely admitting a lead-pencil. In the centre of the inflamed part was a small perforation which had led to suppurative peritonitis.

- 14. Heller, in a pathological specimen, found a true intussusception of a Meckel's diverticulum.
- 15. Heller.—Post-mortem result in a patient aged fifty-six years who had died of perforating ulcer of the stomach. Movable cord found in the lumen of the intestine with a marked swelling at the end. A hollow on the outside about one centimetre from the mesenteric attachment, cause of invagination of the diverticulum. At the apex of the diverticulum was an accessory pancreas.
- 16. Heller.—Post-mortem in a patient who died of pyonephritis; 180 centimetres above the ileocæcal valve a worm-like body, about ten centimetres long, projecting into the small intestine, covered with mucous membrane. This was an invagination of a diverticulum of the small intestine.

THE OPERATIVE TREATMENT OF CANCER OF THE BREAST.

WITH AN ANALYSIS OF A SERIES OF ONE HUNDRED CONSECUTIVE CASES.

BY J. COLLINS WARREN, M.D., HON. F.R.C.S. (ENG.), OF BOSTON, MASS.,

Professor of Surgery in Harvard University.

(Assisted by Walter B. Odiorne, M.D., and William F. Whitney, M.D.)

THE new method of operating upon the breast for cancer has now been in use for a sufficient length of time to enable even the most critical observers to obtain a satisfactory estimate of its value.

The reports which have been received from time to time by various writers fail usually to give as complete and convincing details as to the relief or curability of cancer by this operation as the professional public would like to obtain.

With this end in view therefore, the writer has collected a series of 100 consecutive cases of cancer of the breast, taken from his hospital and private practice, in which at least three years have elapsed from the time of operation.

These cases have all stood the test of careful microscopic examination,—in the large majority of the cases by one observer (Dr. W. F. Whitney),—and their subsequent history has been relentlessly followed up by Dr. Walter B. Odiorne. The returns are therefore so far complete that the writer is able to give end results bearing upon all important points of interest in connection with this operation.

This group represents an average set of cases such as the surgeon would consent to operate upon with hope of benefit, if not of cure, to the patient. There has been no attempt to select favorable cases, only those cases being rejected where it was manifestly impossible mechanically to remove the disease with the knife. The results may therefore be said to give us

27 805

an idea of what we may expect to accomplish under the usual conditions of surgical practice. A careful analysis of the different types and stages of the disease shows also what we have a right to hope for under more favorable conditions.

During the period embraced by this series, which covers nearly two decades, the operation has undergone many radical changes; but even in the earliest cases the scope of the operation was a sufficient departure from old methods to bring them within the pale of modern work. The ever-increasing improvement in technique and diagnosis and the education of medical men to recognize the importance of early surgical interference will justify the hope that still more encouraging results may eventually be obtained than are shown in this article. It is now my custom, in all cases of tumor of the breast, in which there is uncertainty as to the nature of the growth, to explore the gland through the so-called Thomas incision, and thus arrive at the earliest possible diagnosis.

Etiology.—There are some interesting facts brought out under this head, particularly those bearing upon the origin of the disease in pre-existing lesions of the breast. There were five cases in which it was evident that cancer had developed as a secondary process in either a cyst wall or in that chronic inflammatory condition of the gland tissue which is the accompaniment of cystic degeneration. In three other cases, not in this series, I have also observed the changes of cyst into cancer. One of these cases I saw nearly two years before operation was finally performed, and cancer was then found growing in the cyst wall.

All but one of the five cases in this series are reported as "cures." In another case cancer was found growing in a small fibroma, about the size of a horse-chestnut, which had existed for over twenty years. Such experience is strong testimony in favor of the early operation of non-malignant tumors of the breast. Still more marked is the influence of true inflammation, whether arising from sepsis or trauma. There was a history of abscess in six cases and a history of some kind of blow in sixteen cases. Adding these cases together, we

find the existence of a pre-existing lesion of some kind in twenty-eight cases. There was a family history of cancer in eighteen cases. The age of the patients is definitely known in ninety-nine cases, and the following table shows the disease to be most commonly observed in the sixth decade.

Age of Patients at Time of the Appearance of the Disease.—One case observed between the age of 20 to 29 years (inclusive); 14 cases between 30 to 39 years; 28 cases between 40 to 49 years; 36 cases between 50 to 59 years; 15 cases between 60 to 69 years; 5 cases between 70 to 79 years.

The average age of those cases cured by operation was 52.9 years. The youngest cured was thirty-one years old and the oldest seventy-three years old.

Diagnosis.—The pathological diagnosis was made in the great majority of cases by one individual, and the terms used, therefore, have a distinctly comparative value. "Medullary cancer" was the report in forty cases; "cancer" in twenty-six; scirrhus in twenty-eight; adenocarcinoma in three; colloid cancer in two, and Paget's disease in one. A careful record in duplicate was kept of the diagnosis of the case in every operation performed at the Massachusetts General Hospital, and a similar system was carried out at each operation in private practice. A pathologist is present at each operation, and a provisional diagnosis is made by the microscope at the time. A report is made also of the condition of the lymph-glands removed, and dissection is continued until the report comes back that the last gland removed was not infected. If the disease approaches too near the healthy border of the structures removed, the operator is immediately advised of the condition. This system has been carried out in nearly every case, and the writer has found it of the greatest assistance in making an intelligent dissection of the parts involved. Of late, microscopic sections of the specimens have been preserved, and it has thus been possible to make a new study of certain cases, those in which a cure has been effected being of special interest.

One most valuable feature of this system, that is. of having a trained pathologist at the operating-table, is the pos-

sibility of thus saving all breasts in which the growth is not malignant. In this way, and by means of the Thomas incision, the mammary gland may be inspected from behind, benign morbid growths removed, and the organ restored to its original The writer has devised an operation for this purpose, which he proposes to describe at length in another article as "Plastic resection of the mammary gland."

Prognosis.—Of these 100 cases there are twenty-six that can be regarded as cured, that is, the patients are either alive now (free from recurrence) or have died from other causes than cancer at a time three years or more after the operation or after the removal of recurrent growths. These cases are Nos. 1, 2, 3, 4, 5, 9, 14, 19, 20, 35, 38, 39, 42, 44, 54, 59, 60, 64, 66, 76, 77, 79, 81, 93, 97, 98.

Two of these cases had recurrences,—one in the axilla and one in the pectoral region. The former appeared five years and the latter nine years after operation. These nodules were removed, one fifteen years ago and one ten years, and both patients are alive and well at the present time.

Seven of the twenty-six cases have died of causes other than cancer, there having been no recurrence in any case at periods from four to fourteen years after the operation. These cases have been subjected to searching inquiry, and the writer is satisfied that death was in no case due to cancer.

Cause of Death in "Cured" Cases.

2.—Apoplexy, 10 years after operation.

5.—Cholera, 6 years after operation.

9.—Pulmonary hæmorrhage, 14 years after opera-CASE tion.

CASE 20.—Grippe, 13 years after operation.

Case 42.—Pneumonia, 10 years after operation. Case 60.—Apoplexy, 8 years after operation.

CASE 77.—Pneumonia (myxœdema), 4 years after operation.

In addition to these cases there are four patients, who are alive and well without further recurrence, in whom recurrent nodules have been removed. These cases will be referred to more at length under the head of "recurrence."

We have therefore at the present time twenty-three cases that are alive and well and seven that have died of other causes than cancer,—a total of thirty out of 100 cases, or nearly one-third.

Of the remaining nineteen cases in which the patient is alive and well without recurrence over three years after operation.

I is alive and well 20 years after operation.

				19	"	"	"
ı "	"	"	"	18	"	"	"
ı "	"	"	66	14	"	"	"
ı "	"	"	"	ΙI	"	"	"
2 are	"	"	"	IO	"	"	"
2 "	"		"	8	"	"	"
3 "	"	"	"	7	"	"	"
5 "	"	"	"	5	"	"	"
I is	"	"	"	4	"	"	"
ı "	"		"	3	"	"	"

It will be observed that the majority of living "cures," twelve out of nineteen, range on this list from five to ten years after operation,—there being only five living over ten years after operation.

This small number is to be accounted for by the average age of the patients, fifty-three years, as those who have survived the operation ten years are always liable to the susceptibilities of elderly people, as the table of deaths from "other causes" shows. Recurrence, as will be seen lower down, has played no part in the mortality of the more mature cases, for in no case has a recurrence been seen after a period varying eight to nine years after the operation.

The pathological status of the cases cured is interesting, and a study of this point is suggestive as valuable aid to the prognosis in any given case. In two cases the diagnosis was "colloid cancer;" in six cases "cancer;" in twelve cases "scirrhus;" in three cases "medullary cancer;" in one case Paget's disease, and in two cases adenocarcinoma.

If we compare these figures with the total number of each variety of cancer, we find that in colloid cancer and in Paget's disease there were 100 per cent. cures.

In adenocarcinoma 66 per cent. cures; in scirrhus 43; in cancer 23, and in medullary cancer only 7 per cent. cures.

Thus it appears that the most favorable diagnosis is that of colloid or of Paget's disease of the nipple, and that adenocarcinoma comes next. These, however, are unfortunately rare forms of the disease. "Scirrhus" and "cancer" together constitute more than half the cases, and the percentage of cures in these two varieties combined is about 33. If, however, we combine all the varieties except "medullary," we have sixty cases with twenty-three cures, or 40 per cent. Unfortunately, the remaining forty cases, being medullary, have the small percentage of 7 in the list of cures.

The following table gives a summary of these percentages:

Percentage of Cures in Each Variety of Cancer.

0 1		3 -1	•
Disease.	No.	Cures.	Percentage.
Colloid	. 2	2	100
Cancer	. 26	6	23
Scirrhus	. 28	12	43
Medullary	40	3	7
Paget's disease	I	I	100
Adenocarcinoma	3	2	66
	—		
	100	26	
Disease.	No.	Cures.	Percentage.
Non-medullary	. бо	23	38

Clinical Stages of the Disease.—The clinical course of the disease may be divided into three stages, which are sufficiently well marked from one another for the purposes of classification.

The first stage includes all cases in which the disease still remains practically in the condition in which it was when first discovered by the patient. This is characterized by the presence of a lump in the breast from one to two inches in diameter, and usually one or more perceptibly enlarged glands in the axilla.

As the figures show, this is of several months' duration, though it may last for several (three to four) years.

The second stage marks the beginning of the period of visible activity in the growth. The nodule which has remained for months quiescent begins gradually to increase in size, the skin to become adherent, and the glands to show themselves more plainly in the axilla. The patient now, for the first time alarmed, seeks advice. This accounts for the very large number of cases operated upon in this stage (between one-third and one-half of the total number). In the third stage are included all cases which have advanced beyond the immediate neighborhood of the primary focus, and have involved adjacent regions, either by direct extension or by metastasis. In such a category should be placed all cases which involve the whole breast or tissues contiguous to the mammary gland-such as the muscle, the skin, elsewhere than in direct contact with the growth, or the fasciæ—as well as the various metastases. Spreading of the infection to glands above the clavicle would alone constitute a condition necessary to place the disease in this class, even though the primary focus had changed but slightly.

Analyzing the cases on this basis, we find forty-five in the first stage of the disease at the time of operation. The number of cases cured in this class was nineteen. Thus it would appear that when the disease was operated upon promptly, we have as a result a percentage of cures as high as 42 per cent. But looking more closely into the duration of the disease before operation, we find that, of the forty-five cases of this class, in three only was it a question of weeks, and in these three cases there were no "cures." In twenty-eight cases the disease had existed from one to ten months, and here there were ten "cures." On the other hand, of the fourteen cases in which the disease had lasted over a year there were eight "cures." In one case the duration of the disease is not stated. We must

infer, therefore, that, although promptitude is all-important in surgical intervention, much depends upon the degree of malignancy of the growth.

Still, it is a consolation to know that we find cures even in the late stages of the disease, for in the second stage we have thirty-five cases with six "cures," showing that when the disease was operated upon in its second stage we had 17 per cent.

There were nineteen cases that may be said to have been in the third stage with one cure, No. 81 (see below), or 5 per cent.

Summarizing these data, we have the following table:

Stage.	No. of Cases.	Cures.	Per Cent.
I	45	19	42
2	35	6	17
3	18	I	5

There were two cases in which death resulted from the operation, and which are therefore not included in this list.

Adherence of the Skin.—As the determination of a first or second stage is one which might vary with different diagnosticians, the forecast of any individual case could not always be so easy to determine by the aid of the above figures as by a consideration of the prognosis in the case of some very characteristic lesion, such as the adherence of the superjacent skin.

There were twenty-three cases in which the skin was adherent to the growth; of these

```
6 died within a year after operation;
```

⁵ died I to 2 years after operation;

¹ died 2 to 3 years after operation;

⁴ died 3 to 4 years after operation;

I died 51/2 years after operation;

² recurrences, 4 years after operation (now alive and well);

⁴ cures, 13, 10, 6, and 4 years after operation.

There are in this series about 17 per cent. cures. We may therefore say that adhesion of the skin diminishes by one-third the chances of cure. It should, however, be said that 26 per cent., or over one-quarter, of these cases are alive and well at the present time.

Axillary Infection.—In seventy-two cases enlarged glands were felt in the axilla. In seventeen cases there was no axillary involvement. In eleven cases no record was made. Of the seventeen cases in which there was no infection of the axillary glands eleven are cures,—that is, cures were effected in 64 per cent. of the cases in which no glands were felt.

Among the twenty-six recorded cures there are twelve cases in which there is a record of enlarged glands being felt in the axilla. In eleven cases no glands were felt, and in three no record is made.

Of the above seventy-two cases in which enlarged glands are recorded as present, there were eight in which glands were also felt above the clavicle. One of these cases died of the operation. Six died of recurrence, but lived on an average 19.8 months after the operation. One individual lived nearly three years after the operation. One is living with recent recurrence eight years after operation (Case 55). In all these cases a very thorough dissection of the posterior cervical triangle was made, Lut no permanent cure has been obtained.

ANALYSIS OF CASES CURED BY THE OPERATION.

A brief comment on each case cured is given below in order to bring out any peculiarities which may be recognized as contributing to the favorable result.*

^{*}The terms used to designate the different types of cancer can be briefly explained as follows: Under scirrhus are classified those in which the connective tissue markedly exceeds the epithelial cells; under medulary, those in which the reverse is the case; under cancer, those where they are about equal. The adjuncts plexiform and adeno describe peculiarities in the arrangement of the epithelial cells. Illustrations of small (scirrhus) and large (medullary) plexiform adenocarcinoma are given in the microphotograph plate, Figs. 1 and 2.—(W. F. W.)

CASE 1.—This was a case of colloid cancer which had already existed three years and seven months previous to the operation; an enlarged gland was removed from the axilla five years after the operation. She is now alive and well sixteen years after the last operation.

Case 2.—The diagnosis given in this case was "cancer." The duration of the tumor was uncertain. The patient was sixty years of age, and had a tumor the size of a walnut in the inner hemisphere; no infected glands were found in the axilla. It was probably what now would be considered a case of adenocarcinoma. The patient died of apoplexy at the age of seventy. She was stout and of plethoric habit. There had been no sign of recurrence.

CASE 3.—This was a typical scirrhus in a woman forty years of age. Duration of tumor one year. No glands were felt in the axilla, but one very small nodule was found after removal of the axillary contents. She is alive and well to-day, nineteen years after the operation.

Case 4.—This patient was sixty years of age, and the tumor had been observed two months at the time of operation in 1885. The tumor was the size of a hen's egg and was in the upper inner quadrant. In 1894 a cancerous nodule was removed from the pectoral region, below and outside scar. She has been seen within a year; that is, ten years since the last operation, and is alive and well without recurrence. In this case microscopic examination showed masses of large epithelial cells in a stroma of connective tissue. "Cancer."

CASE 5.—A case of "cancer" in a woman sixty-five years of age. Duration of tumor, two months. There was considerable glandular infection, and I regarded the prognosis at the time as unfavorable. She died in mid-summer, six years later, at the age of seventy-one, of "sporadic cholera," and never had any sign of recurrence.

Case 9.—The patient was thirty-eight years of age, the duration of the tumor six months, and the diagnosis was "scirrhus." The growth in the breast was the size of a walnut, and there was one infected gland in the axilla. She was examined repeatedly by me, and no sign of local recurrence was found. She was reported by her physician to have died of pulmonary hæmorrhage fourteen years after operation, and that this in his opinion had no relation whatever to a recurrence of the original disease. Micro-

scopic examination. "A dense retracting mass showing small nests of epithelial cells in the midst of firm connective-tissue stroma. The scraping from the gland showed an occasional epithelial cell."

CASE 14.—This was a woman fifty years of age with a tumor of six months' duration. It proved to be a case of cancer developing and spreading from the walls of a cyst. The patient was last heard from five years after the operation, and was alive and well at that time.

The following is Dr. Whitney's report:

"The whole gland is replaced by a dense white tissue in which were several cavities, the largest as big as a robin's egg. These were lined with a smooth membrane and had evidently contained fluid. On microscopic examination the basis of the growth was found to be composed of a dense fibrous tissue. In this were embedded the altered glandular elements. In places the ducts were dilated, evidently the origin of the large cysts seen in gross. Here and there the acini of the gland were reduced in size and the cells smaller as if undergoing atrophy. In other places the cells had proliferated, and extended widely from their original place in a plexiform net-work into the surrounding tissue. In places the lines of cells appeared to follow the lymphatics; here and there a compound granular cell, and in general, a decided tendency to fatty degeneration.

"The growth seems to be a diffuse interstitial fibroma in which the gland elements are now beginning to proliferate actively (commencing cancer)."

Case 19.—The patient was fifty-one years old; the disease had existed seven months. The microscopical diagnosis was "cancer," and the glands in the axilla were found non-infected. The patient is alive and well thirteen years after operation. The nodule when examined was the size of a walnut in the upper outer quadrant deep in the substance of the breast. The cut surface was marked by yellowish opaque lines and dots. Under the microscope there was a dense connective-tissue stroma with relatively small masses of cortical epithelium in the spaces. The glands were enlarged, but in the one examined there was no distinct nodule of new growth.

CASE 20.—Fifty-two years of age; duration of disease, twenty months. The mass is described in the report as the size

of a small orange in the upper inner quadrant; glands in the axilla involved. She died of "grippe" thirteen years after operation. Pathological report. "A large, dense nodule deep in the breast with a radiating appearance, and the surface marked by yellow opaque lines and dots. Microscopic examination showed masses of cubical gland cells deep in the connective tissue. Cancer."

Case 35.—Sixty years of age. Duration, thirteen months. Hard tumor size of hen's egg movable on muscle; skin adherent. A chain of glands running high up was found in the axilla at operation. The diagnosis was "cancer." Alive and well eleven years after operation. Microscopic examination. "A large nodule extending quite through the thickness of the breast, showing masses of epithelial cells in a stroma of vascularized connective tissue. The axillary glands were infected with a growth of similar character."

Case 38.—Thirty-five years of age. Duration of growth, five years. Tumor size of goose-egg. Diagnosis, "cancer." Alive and well eleven years after operation. Microscopic examination. "Nodule size of an egg in the periphery of the breast and adherent to it, but not to the skin. The section surface was grayish, slightly translucent, and thickly covered with small, opaque, yellow spots from the size of a pin's point to a pin's head. This on microscopic examination was found to be made up of solid masses of epithelial cells lying in a connective-tissue net-work." Axillary glands were infiltrated with a similar growth.

Case 39.—Fifty years of age. The duration was known very accurately in this case, as patient (whose mother had died of cancer) had been warned to be on the lookout at same age. The operation was performed within the month. Two small nodules the size of a pea were found in the breast, and one gland about one-third of the size in the axilla. The diagnosis was "scirrhus." Alive and well eleven years after operation.

Case 42.—Sixty years of age. Disease of two years' duration. Nodule in skin on axillary border over upper and outer quadrant; a few glands felt in the axilla. Died of pneumonia ten years after operation. This type has been described by me as "cancer of the axillary border;" (Boston Medical and Surgical Journal, November 12, 19, 1896, and January 21, 1897; Inter-

national Text-Book of Surgery, Vol. ii, p. 280; Hektoen, Text-Book of Pathology, p. 1089;) and if untreated runs the typical course of cancer of the breast. In this respect it resembles closely Paget's disease of the nipple.

Case 44.—Fifty-three years of age. Duration, three months. Mass size of walnut; no glands felt. Diagnosis, "scirrhus." Alive and well ten years after operation. No swelling or restriction in the use of arm (a frequent report in reply to questions on this point in other cases). Pathological report. "A very small, dense, retracting nodule just beneath nipple, containing masses of epithelial cells in a dense connective-tissue net-work."

Case 54.—Forty-five years of age. Duration, five months. This was an excellent example of cancer originating in an involution cyst. The following is Dr. Whitney's report: "The tumor was a large, diffused mass more or less opaque, dotted with yellow lines in the midst of a fibrous, thickened gland with numerous cysts small in size. Microscopic examination showed the growth to be made up of small, solid masses of epithelial cells in the midst of a connective-tissue stroma. The axillary lymph glands were slightly enlarged, but as far as could be determined were not invaded by the disease. The diagnosis is a scirrhus cancer originating in a diffuse fibroma of the breast with retention cysts."

Case 59.—Forty-nine years of age. Duration not stated. There was a small, dense, fibrous retracting nodule the size of the tip of the finger deep in the breast tissue. Microscopic examination showed masses of rather small, irregular epithelial cells separated by a dense stroma of fibrous tissue. The axillary glands were infiltrated with a similar growth, but those at the highest point of the tissue removed both in front and behind the great vessels were normal. The diagnosis is "scirrhus."

The patient is alive and well nine years after operation.

Case 60.—Sixty-six years of age. Duration, three years. Diagnosis, "atrophying scirrhus." Small gland felt in axilla. Died of paralysis eight years after operation, at age of seventy-four. During the intervening period had frequently reported, and was known to have been perfectly well.

Case 64.—Sixty-three years of age. Duration, seven months. Mass size of lemon in upper outer quadrant. No glands felt in axilla. Pathological report. "Nodule fibrous and infiltrated with

relatively large areas of opaque puriform-looking material in the substance. The microscope showed masses of epithelial cells, large and irregular, undergoing a rapid fatty degeneration, separated by a stroma of connective tissue. Neither by the eye nor by the microscope was there any evidence of a new growth in the glands." "Medullary cancer."

CASE 66.—Fifty-eight years of age. Duration, six months. Diagnosis, "medullary cancer." Nodule in upper inner quadrant, size of horse-chestnut; few slightly involved axillary glands. (Recent study of the specimen by Dr. Whitney shows a pseudo-alveolar formation; no infiltration of surrounding tissues; no invasion of lymph nodes. Diagnosis, adenomedullary type.) (Fig. 1.)

Case 76.—Fifty-one years of age. Duration, ten months. There was a mass the size of a walnut in the upper inner quadrant occupying the entire thickness of the mammary gland and a small nodule in the pectoral muscle. The axillary glands were not implicated. A recent study of the specimen by Dr. Whitney classifies it as an adenoscirrhus. (Fig. 2.) "The growth was composed of masses of small epithelial cells in a close plexiform arrangement in places, with a distinct gland-like arrangement about a central opening. These could be followed in the connective tissue between large and small bundles of muscular fibres."

CASE 77.—This patient was seventy-three years of age and had myxcedema. The wound healed slowly, but without sepsis. She died of croupous pneumonia four years after the operation. Microscopically, there were small alveoli close together, the same condition in the lymph-glands. Diagnosis, adenoscirrhus. There was a hard nodule about three centimetres in diameter, beneath a retracted nipple, in a large breast.

CASE 79.—Sixty-five years of age. Duration, two years. Colloid cancer originating from an involution cyst. No glands felt. "Retention cysts with mucous degeneration of the stroma of cancer, which was of the small plexiform scirrhus type."

Case 81.—Forty-six years of age. Duration, twenty months. "Medullary cancer with cystic degeneration." Tumor was a large nodule about six centimetres in diameter close to the nipple and adherent to the skin, which was reddened. The centre of the nodule was occupied by a cystic cavity about three centimetres in diameter. The aspect of the surface was grayish and



Fig. 1 -Large plexiform adenocaremoma ("adenomedullary") | Case No 66



Fig. 2 —Small plexiform adenocarcinoma ("adenoscirrhus") | Case No. 76



medullary. Microscopically there were large, solid masses of epithelial cells separated only by bands of fibrous tissue. These cells had a marked tendency to softening, and in places were only left intact in close proximity to the vessels. In other places the cells had apparently grown into and filled small cystic cavities (of which there were numerous ones in the immediate vicinity of the growth), making a coarse plexiform arrangement. Everywhere in the gland tissue there was a slight tendency to proliferation of the epithelium. There were eight or ten lymph nodes in the specimen, many of which were infected, but the node from the highest point in the axilla as well as those above the clavicle did not show any infection.

Case 93.—Thirty-one years of age. Duration, eight weeks. Mass size of plum under nipple. Nipple retracted. No glands felt. Small plexiform adenoscirrhus. (Fig. 2.) Lymph nodes the same. Diagnosis, adenocarcinoma.

Case 97.—Sixty-three years of age. Duration, two years. There are several small nodules varying from one centimetre to three centimetres in diameter in the mammary gland. One of these in the line of a cicatrix of an old abscess many years before. There was a tendency to form dense fibrous tissue in all these nodules. In the axillary fat one rather large and two small exceedingly hard lymph nodes were found. Under the microscope the main growth was made up of small, solid masses of epithelial cells, separated in places by a meshwork of dense fibrous tissue of varying thickness. In places this could be seen extending along the outside of the smaller ducts.

CASE 98.—Forty-four years of age. Duration, nine years. Diagnosis, Paget's disease. No axillary involvement. The downward growth from the rete could be distinctly followed microscopically.

A study of these cases seems to show in the majority some peculiarity throwing light upon the favorable issue. Nearly one-half were typical scirrhus (see list above). Several (four) originated from involution cysts. In another case my early diagnosis (three days) seemed to contribute to the favorable result. The case of Paget's disease and those which I have termed "cancer of the axillary border," where the disease also begins superficially and spreads ultimately into the mammary

tissue, seem also examples of a favorable type; yet there is one of this latter type in the list of deaths with metastases in the spinal column, showing it to be a true "cancer of the breast." That youth is not always a sign of unfavorable prognosis, Case o is proof, the age of the patient being thirty-eight years.

It is encouraging to see several distinctly unfavorable types of the disease in this list of cures, such as Case 5, about which I was at the time of operation quite despondent; Case 35, where the skin was adherent to the growth; and Cases 66 and 81, which were examples of medullary cancer.

In a recent study of the specimens of several of the above cases, Dr. Whitney finds two which are of a distinctly unfavorable type. In Case 81 all the marks of a rapidly growing cancer were present. In Case 77, although of a more fibrous type, with relatively small cells in small plexuses, still, the axillary infection was very marked, and many small vessels in the surrounding fat tissue were filled solidly with cells. Whether these were small veins or lymphatics with thickened walls was hard to determine; in either case it added to the gravity of the prognosis, as, when once the disease is in the veins, metastases in distinct organs are rarely absent.

Recurrence.—The date of death is known in sixty-one of the cases in which death from recurrence occurred. In these sixty-one cases the average duration of life after operation was two years and one month.

In fifty-two cases the date of appearance of recurrence is noted. The average space of time was one year and ten months after operation.

This series includes Cases 1 and 4, in which there were late recurrences, but which are now in the list of cures, and Cases 55, 56, 74, 84, 89, 92, and 94. These patients are now either living with recurrence or have had recurrent growths removed within three years.

Excluding these nine cases, there are left forty-three cases in which death occurred from recurrence, the date of the recurrence being known. It averaged in these forty-three cases one year and two months after operation. In the nine cases

(two cures and seven living, with history of more or less recent recurrences), the average duration of time was much longer, being five years and five months after operation.

Of the sixty-one cases in which death occurred from recurrence of the disease, 7 died before 6 months, 8 between 6 months and 1 year, 22 between 1 year and 2 years, 12 between 2 years and 3 years, 5 between 3 years and 4 years, 2 between 4 years and 5 years, 2 between 5 years and 6 years, 1 between 6 years and 7 years, 1 between 7 years and 8 years, 1 between 8 years and 9 years.

The greatest mortality is at the period ranging from eighteen months to three years after operation.

Of the sixty-one cases, it will be seen that there are twelve, or 19 per cent., which have died after the three-year limit. After a period of five years has elapsed the percentage is as low as 8, and it is not until nine years have elapsed that no deaths are found in the list. These figures show that the three-year limit does not by any means constitute an infallible test of cure.

Returning now to the nine living cases in which there is a history of recurrence, we find two that are "cured," having gone respectively sixteen and ten years since the last operation. The following is a brief statement of the peculiarities of the remaining seven cases.

Case 55 (aged fifty-six years at time of operation) is now alive at time of writing, with symptoms of recurrence in shape of pleurisy and enlargement of the upper end of the sternum and a nodule in the pectoral region, all having appeared within a year, that is, eight years after the operation (January, 1895). This was a case of medullary cancer originating from a cyst with axillary and supraclavicular infection. At the operation the clavicle was divided and the cervical region thoroughly dissected. I had regarded this case until now as the only "cure" in cases where the supraclavicular glands had been found involved.

Case 56.—This patient, forty-five years of age and suffering from scirrhus, had a "recurrence" in the other breast almost eight years after the operation. The breast was removed by a surgeon

in Shanghai, and she is now alive and well, about a year and a half after the second operation. Was this to be regarded as a recurrence or as a new infection?

Case 74 (fifty-six years of age) was a medullary cancer taken early and while the growth was small. An operation was performed in Tokio by a Japanese surgeon on account of the appearance of the disease in the opposite breast, nearly five years later. There was no recurrence in the first operation scar. At last accounts she was failing.

CASE 84.—This was a case of scirrhus with infection of the axillary glands in a woman forty-seven years of age. The operation was performed in April, 1899. A nodule was removed in August, 1902, from the pectoral region, and a section of the second rib was removed in January, 1903. Since then there has been no sign of disease.

Case 89.—Sixty years of age. Duration, one year. Mass size of egg in lower outer quadrant; two areas of infected skin size of three-cent piece below and inside nipple. No glands. Operation, October, 1899. Small nodule removed from pectoral region by Dr. Odiorne in October, 1903. Alive and well at present time. Disease, scirrhus.

CASE 92.—Sixty-one years of age. Duration, eighteen months. Mass size of egg in upper outer quadrant. No glands. Operation, November, 1899. Nodule removed from scar in pectoral region by Dr. W. B. Odiorne in July, 1903.

CASE 94.—Patient, thirty-six years of age. Duration, two and a half years. Mass size of walnut in scar of an incomplete operation seven months before. Adherent to ribs. Diagnosis, adenocarcinoma. No recurrence for three years, when disease reappeared in cicatrix. No secondary operation has been performed.

It will be seen that four of these cases are alive and well at the present time, but as none of them has gone through a period of more than eighteen months since the last operation, they cannot be regarded as cured.

They are all cases, however, which furnish ample justification of the operation performed, for in two cases there was a respite of eight years from disease, and in one of five years; and one of these patients is alive and well nine years after her first operation. Another is now alive and apparently well five years after her first operation in spite of two recurrences.

In two of these cases the disease reappeared in the opposite breast. This locality of recurrence, if we consider it a recurrence, was found in eight cases of the entire 100 cases, but in only one other beside the two mentioned was there an independent development of the disease in the opposite breast, there being no sign of a return in the operation scar. The comparatively frequent association of disease in the opposite breast with recurrence in the side originally affected, as shown in Cases 26, 27, 69, 90, and in Case 40, where both breasts were affected simultaneously, makes it seem highly probable that these are not examples of so-called "new infections," but that the breast must be regarded as in the same category with the brain, the uterus, and other distant regions such as the bones of the inferior extremity, which, although not in the direct track of the disease, occasionally become infected.

Palliative Operations.—There are fourteen cases in which the disease may be considered to have advanced so far that a radical cure could not be expected; but these cases were all given a chance, as the new operation might give a long respite, if not an occasional cure, such as we have seen in one case at least in the third stage of the disease reported above. (Case 81.)

These cases may be briefly noticed to show their general character. In Case 6 the skin was involved, and there were roselike outgrowths, and the glands in the axilla were the size of a lemon. Recurrence, however, did not take place until two and one-half years after operation, and the patient lived nearly three years.

CASE 7.—Brawny infiltration of breast with pregnancy; death three months later.

CASE 13.—Tumor size of cocoanut. Skin adherent; death in six months.

CASE 18.—Tumor size of an apple, with glands above clavicle. Recurrence in eleven months; death two years after operation.

CASE 24.—Tumor size of orange; skin adherent and ulcerated; the glands are adherent to the axillary vessels. Death eighteen months later.

CASE 30.—The disease involved the whole breast; offensive ulceration; the axilla was filled with infected glands; but the patient lived over eight years. At the autopsy, the lungs, pleura, chest wall, liver, and long bones were found involved.

Case 32.—General involvement of breast. Orange skin. Death in six months.

CASE 61.—Puerperal cancerous mastitis. Death in three months.

CASE 67.—Primary nodule adherent to skin and muscle. Nodules in skin. Glands in axilla. Death in fourteen months.

Case 73.—Whole breast involved and enlarged glands above clavicle. Died of pulmonary embolism five days after operation.

Case 75.—Tumor size of cocoanut. Axillary glands could not all be removed. Died in fourteen months.

CASE 85.—Could not all be removed; died within the year.

Case 90.—Orange-skin breast. Glands above clavicle. The patient lived nearly three years, for two of which she enjoyed excellent health.

CASE 94.—Operation for recurrent disease following an incomplete operation seven months before. Adherent to ribs. Adenocarcinoma. Recurrence three years later.

I think it is fair to assume that in none of these cases had the surgeon any right to give hope of cure, and yet one lived two years, three lived three years, and one died eight years after operation. In this latter case there was an offensive ulceration from which she was entirely relieved, the patient dying of internal metastases (Case 30).

Such a case as this is an encouragement to the surgeon to attempt relief under most discouraging circumstances.

Situation.—A record of the situation of the disease has been kept in seventy-four cases, as follows: Upper outer quadrant, 17; centre of breast, 12; upper hemisphere, 10; lower outer quadrant, 8; upper inner quadrant, 7; whole breast, 7; outer hemisphere, 7; lower hemisphere, 3; lower inner quadrant, 1; inner hemisphere, 1; axillary border, 1.

The disease was more frequently observed in the upper hemisphere than in the lower; in the outer hemisphere than in the inner hemisphere; and in the upper outer quadrant than in any other quadrant.

Looking over the list of cures with reference to the situation of the growth, we find an accurate statement in eighteen only. Among these, in five the growth was somewhere in the inner hemisphere, in four somewhere in the outer hemisphere, in five somewhere in the upper hemisphere, and in three in the central region of the breast.

Inasmuch as only nine cases are stated definitely to have been in the inner half of the gland, it is evident that the percentage of cures is much higher in this hemisphere than in the outer.

Duration of Disease.—Although we have stated elsewhere that the percentage of cures is much higher when the disease is operated upon in its early stages, a study of the duration of the disease before operation does not appear to bear out this view. The average duration of the disease in the 100 cases was 11.8 months before treatment, but the average duration in the twenty-six cured cases was 12.3 months. Here we find a longer interval had elapsed before operation in the successful cases: this can probably be explained by the supposition that the disease in these cases was of a milder character and remained for a longer time in the primary stage.

Retraction of the nipple was recorded in twenty-two cases.

Operation.—The operation which was performed in the first fifty cases consisted in a removal of the breast and pectoral fascia and a dissection of the axilla. In the second fifty the "completed" operation, as it is now understood, was performed, both pectoral muscles being removed, the clavicular portion of the pectoralis major being left behind, and the posterior cervical triangle frequently dissected. Lately, it has been my habit to omit the dissection of the triangle in case microscopic examination of the higher axillary glands shows that the limit of infection has been reached.

It may be worth noting at this point that the results of

operation in these two series of fifty cases show a slightly greater number of cures where the lesser operation had been performed. In the first fifty there were fourteen cures, and in the second fifty only twelve.

This was due to the fact that Cases 1, 2, 3, 4, and 5 were all cures; but, allowing for this unusually fortunate series of consecutive cures, we do not find any striking differences in the results of the two methods.

In the greater portion of the second series the method known as the Halsted operation was conscientiously followed. Latterly, however, i.e., during the past year, I have adopted the method given below, and find it one that I can recommend as both safe and thorough. Safe, because—following as it does anatomical lines—the vessels are divided at their point of origin at the beginning of the deep dissection, and hæmorrhage is thus controlled without unduly prolonging the operation, while the greater portion of the wound is not exposed until the close of the operation. Thorough, because it permits of a free exposure and dissection of the axilla up to the point of the disappearance of the axillary plexus of lymphatic glands beneath the clavicle before the mass to be removed has been dislodged from its attachments and allowed to interfere with the anatomical relations of the parts.

An "anatomical operation" for cancer should of course only be so far permitted in that it facilitates the freest possible removal of the diseased parts. It should always be remembered that the indications are in cancer to stamp out the disease. All other considerations which enter into so many other operations should be disregarded, with the single exception of the safety of life. Anatomy and æsthetics should always play a secondary rôle. This having been conceded, there is still much that can be done to make the operation less exhausting and disfiguring than some of the "completed methods." It should be said here, however, that the modern operation, as now performed by the most conscientious surgeons, is always to be preferred to the feeble imitations that one often sees, even at the present time, in hospital practice.



Fig. 3 shows the amount of skin included in the racket-shaped incision; also the flap which is diminished in appearance by perspective.

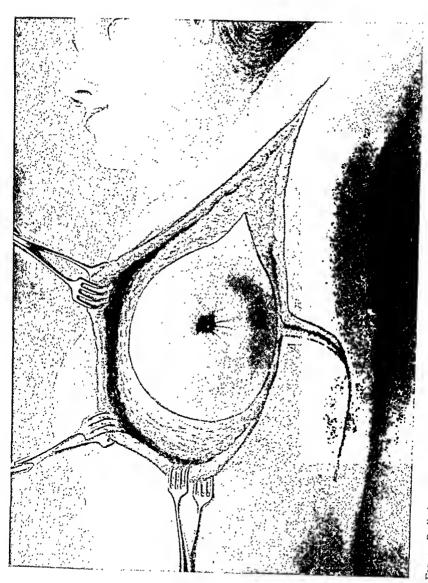


Fig. 4.—Preliminary dissection of the integuments in all directions, leaving a pyramidal mass of tissues to be removed, of which the primary nodule is the apex.

The steps of the operation, as I have performed it, are as follows:

An incision is made from the anterior and outer margin of the axilla running a little above its upper border and the line of insertion of the pectoralis major muscle around the lower border of the breast to a point on the boundary line of the inner and lower quadrant. If there is serious doubt as to the malignant nature of the growth, the breast can be lifted up from below by carrying the dissection of the last half of this incision more deeply, and exploring the mammary gland on its posterior surface. Otherwise a second incision is made beginning at the middle of the anterior axillary fold, gradually diverging from the first incision as it approaches the breast and, sweeping around the upper and inner margin of the organ, meets the first incision at its terminal point. This may be called the preliminary racket-shaped incision. (Fig. 3.) The operator should not tie himself down too rigidly to these landmarks, but the circle should be described around the primary nodule, as nearly as may be, as a central point.

Before proceeding to the second step of the operation, a flap should be marked out on the outer side of the pectoral region. To do this, the knife divides the skin above the middle of the first incision, i.e., on the outer edge of the wound, on a line drawn first at right angles to said incision and gradually sweeping round until it becomes parallel to it and terminates at a point a little below the level of the lower margin of the wound. (Figs. 3 and 4.) This flap is intended to be turned into the lower portion of the wound. Formerly, I made two such flaps, one above and one below, but now find the method of closing in the wound described below to be preferable. The present flap is therefore made longer than the one described in my earlier operations.

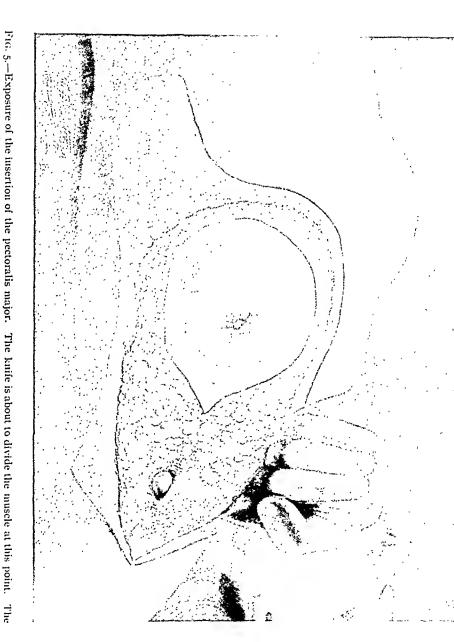
In case there is infection of the cervical region, an additional incision should be made from the middle of the upper half of incision number two along the posterior border of the sternomastoid muscle to expose the clavicle and the posterior cervical triangle. This incision, if necessary, is, however, not to be made until a later stage of the operation.

The second step of the operation is the dissection of the integuments freely on all sides, the axilla included, from the subjacent adipose tissue. The axillary skin and the flap are thus dissected off on the outer and lower side of the wound, and the dissection on the median line is carried well over the margin of the sternum. (Fig. 4.)

Above this superficial dissection should be carried up so as to expose the clavicle. When the skin is reflected back on all sides, a cone with a broad base is exposed, the apex of which is the nipple, and which is composed of the breast, the pectoral muscle, and the surrounding adipose tissue. (Fig. 5.) The removal of these structures en masse constitutes the third stage of the operation. This is done from without inward in a direction exactly opposite to that carried out in the Halsted operation, so that the entire mass to be removed is thrown towards the median line.

Beginning with the humeral insertion of the pectoralis major muscle, the forefinger of the left hand of the operator is slipped under the edge of the muscle from above downward and the muscle is divided a short distance from its insertion. 5.) The proximal end of the muscle is seized by hooks and pulled in the direction of its origin, while its fibres are separated from those in immediate contact with the clavicle. An assistant while holding the hooks gently draws the breast with the other hand in the direction of the epigastrium. A few touches of the point of the knife expose the insertion of the pectoralis minor muscle. The finger is now hooked under this insertion and the muscle divided. (Fig. 6.) When the assistant retracts the breast in the direction already indicated, the axillary region is freely exposed, and the thin fascia overlying the vessels being divided, the larger vessels are readily identified. In this way the dissection of the axilla can be carried out with great precision, and the origin of all the large branches can be secured with the ligature. (Fig. 7.)

Too great care cannot be taken in this dissection, and the various processes of adipose tissue must be sought for and turned back upon the mass to be removed. As the main branches are



latissimus dorsi is also exposed, showing the limit of the dissection outward.

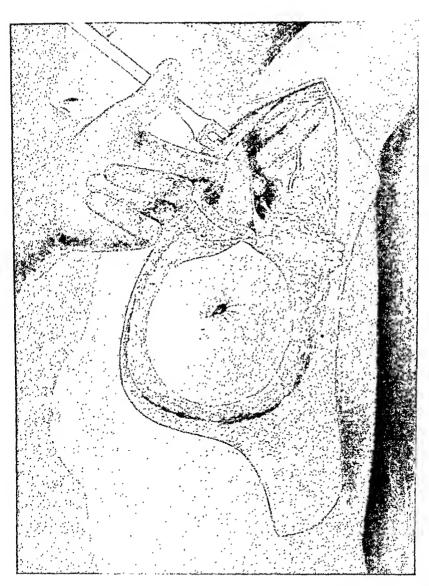


Fig. 6.—Division of the insertion of the pectoralis minor muscle.



Fig. 7 — The divided muscles permit the retraction downward and inward of the breast and available contents and enable the operator to expose freely the axilla and to tie the main branches at their origin.



Fig. 8.—The mass to be removed has been reflected towards the median line; the origin of the pectoralis minor has been divided and the origin of the pectoralis major is being divided as the final step in the operation. The large wound

divided, the dissection can be carried both inward and outward with more freedom, thus allowing the breast to slide gradually inward and downward.

As the dissection of the axilla approaches the clavicle, care must be taken not to cut through the superjacent fat that has been exposed by the earlier dissection, but to reflect it back in every direction towards the centre of the mass, so that the upper edge of the origin of the pectoralis major at the sternal margin is clearly identified. As the dissection proceeds downward and outward in the axilla the adipose tissue must not be divided until the knife can come down upon the latissimus dorsi muscle. (Figs. 5 and 6.) The greatest care must be taken not to separate any of the tissues from the included lymphatic glands or to cut into them. No attempt should be made to save vessels or nerves in the axilla, but the great plexuses must of course be treated without roughness, and there is no necessity for wounding them. Division of the axillary vein has been found necessary in only one instance, and the patient suffered no great inconvenience; but operations in which such radical measures are necessary can be looked upon only as palliative, the disease being advanced too far to admit of a radical cure. At least this is my experience. A slight wound of the axillary vein is easily controlled by catching up the bleeding point with blunt forceps and passing a fine silk ligature around it.

A few sweeps of the knife separate the mass from the latissimus dorsi muscle. The breast is now seized by the operator and rapidly dissected off the thoracic wall from without inward. The origin of the pectoralis minor is first divided, and the final act of the operation consists in severing the origin of the pectoralis major while the breast and attached tissue are firmly held away from the sternal margin. (Fig. 8.)

The time occupied with these three stages of the operation should not exceed forty minutes. and usually thirty minutes are sufficient.

The hæmostatic forceps are now disentangled and each vessel tied with fine silk. I find this material on the whole most satisfactory for the operation, and have experienced no incon-

venience from ligature sinuses. Silk seems to be readily disintegrated and absorbed in this region. Meanwhile the specimen has been handed to a pathologist, and the condition of the peripheral portions carefully investigated. Particular attention should be paid to the most distant glands, and if the report comes back that those near the vessels as they run under the clavicle are infected, the posterior cervical triangle should be exposed. The incision to be made for this purpose has already been described.

After cutting through the deep layer of the superficial fascia of the neck, the posterior border of the sternomastoid is pulled inward and the omohyoid is lifted upward. A thin fascia then presents itself, under which lies a pad of adipose tissue, in which one or more lymphatic glands are found. It is this group which is continuous with those in the upper axillary region and which is first to become infected. (Fig. 9.)

At one time I made this dissection a routine feature of the operation, but, after finding them in the great majority of cases non-infected, I reserve this dissection for those cases only in which there are well-marked indications.

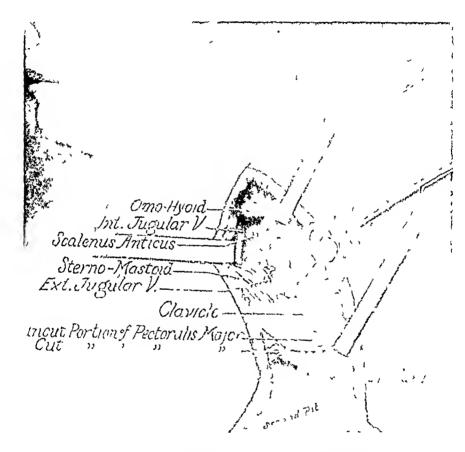
The pad of adipose tissue should be freed as much as possible by blunt dissection, and all bleeding points carefully secured as the operation proceeds.

When the region has been properly cleaned out, it is possible to make the forefingers of each hand come in contact with one another beneath the clavicle. In a few cases I have divided this bone, but do not find that any additional advantage can be gained by this procedure.

I have referred above to a case where this bone was divided in order to remove glands above the clavicle. (Case 55.)

The patient is now slowly succumbing to the disease, eight to nine years after the operation, with infection of the sternum and pleura; but there is no return in the cervical region. Such cases go far to show the very serious prognosis that must be given when the cervical triangle has been invaded.

The closure of the wound in this operation has always been a difficult problem, since it has been decided that the whole in-



I to 9—Dissection of pad of fat continuing three infected glands from sub-liven triangle. The steriomastoid muscle being drawn inward exposes the int in dipolar con-Note the scalenus antiens innsele upon which this pad rests. The glands with the surrounding adipose tissue can be readily stripped from the muscle by a blant dissector. The external jugular vein or a branch of it is usually fied.



Fig. 10—Mode of closing the wound A. The flap has been turned in and caught with one suture. It is gradually being pushed into position by peripheral sutures. B shows how the upper half of the outer edge of the wound is shid under the lower half or flap. Note the shortening of the long axis of the wound by the stitching on the inner border.

tegument of the breast should be included between the incisions. Any method which permits of an easy approximation of the edges of the wound is out of date.

The method of grafting adds materially to the length of the operation and leaves a most unsightly scar. The removal of the breast is at best a demoralizing ordeal to most patients, and every effort should be made to procure as rapid healing and as little unsightly a cicatrix as possible.

So far as the scar itself is concerned, this difficulty is overcome by dissecting the opposite breast away from its attachments to the pectoral muscles and sliding it over to the median line, thus closing the wound without tension. The result is one, however, which produces a deformity of outline which is hardly likely to make this method popular with patients.

The lower portion of the wound is the part where the edges are the most difficult to approximate. The free loosening up of the skin enables the upper portions to come easily together.

The flap made at the outer side of the wound is about the size of the human hand, and when first turned in seems to be totally inadequate for the purpose. To draw upon this flap is to endanger its vitality. For this reason I begin suturing on the outskirts of the wound at four different points, viz., at each end and on each side. A few stitches should be taken at the axillary and at the sternal ends of the wound first. The flap is then turned in (Fig. 10) and held in place by a temporary stitch, while it is gradually pushed up into place from below by sutures firmly girding together the edges of the skin to which the flap was originally attached. Thus it gradually comes about that the point B, which was originally in contact with point A, is rolled in underneath the flap and forces it into position. Sutures should all be superficial, as deep sutures cut and do not give the skin included by them a chance to stretch. In order to enable the edges to come together easily, it should not be forgotten that it is necessary to dissect up the skin for a considerable distance in every direction. This is what the first stage of the operation attempts to accomplish, while it at the same time makes the operation all the more radical. In stout patients the

cavity of the wound is easily closed, but the problem is more difficult in thin individuals. Experience only will enable the operator to determine how much tension can be put upon the flap in inserting the final stitches. In doubtful cases there is no objection to leaving them untied, as the opening thus left serves admirably for drainage. In many cases this opening can be closed by secondary suture a few days later, or it may be allowed to heal by granulation. A small graft may be used to facilitate the process, and I have occasionally resorted to this plan, but rarely find that the granulating wounds are sufficiently large to make such a method desirable.

Fig. 11 shows the wound as finally closed, one or two sutures remaining untied indicate that these are the last to be tied. The position of the drainage gauze—a short and small wick—is indicated. The wound should be dressed at the end of twenty-four hours, and the wick should then be removed.

Mortality.—In this series of 100 cases there have been two deaths from the operation. One was from acute septic infection, due apparently to the fact that the patient had been put in the bed previously occupied by a case of erysipelas. The second case was one of pulmonary embolism caused by allowing the patient to sit up too soon and move about too freely after the operation. Since this experience, I have been in the habit of keeping patients in the recumbent position for one week after the operation, thus allowing time for any thrombus that may have formed to become firmly attached to the vessel wall.

A final word about cancerous infection during the operation. Whether or not there is a possibility of such an occurrence does not seem to me to be fully determined by any data now in our possession. There are, however, some very suggestive experiences familiar to all where exploratory incisions have apparently led to an extension of the disease.

It is my habit to act upon the supposition that such danger exists, and throughout the operation to attempt to keep the parts exposed protected as much as possible by gauze packing. The operation which I have described has this advantage, that ninetenths of the wound is not exposed, or in fact touched by an

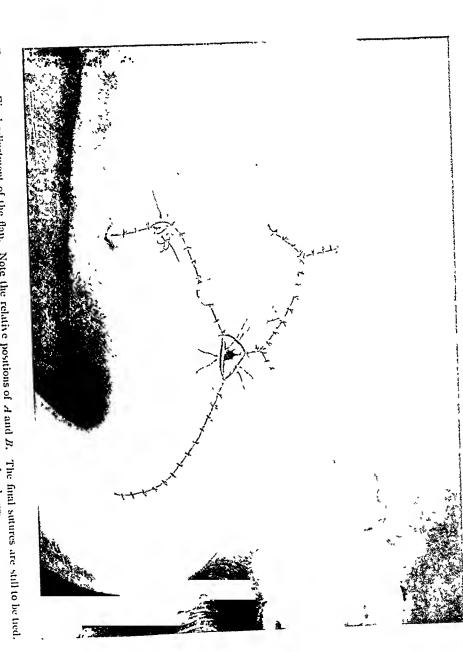
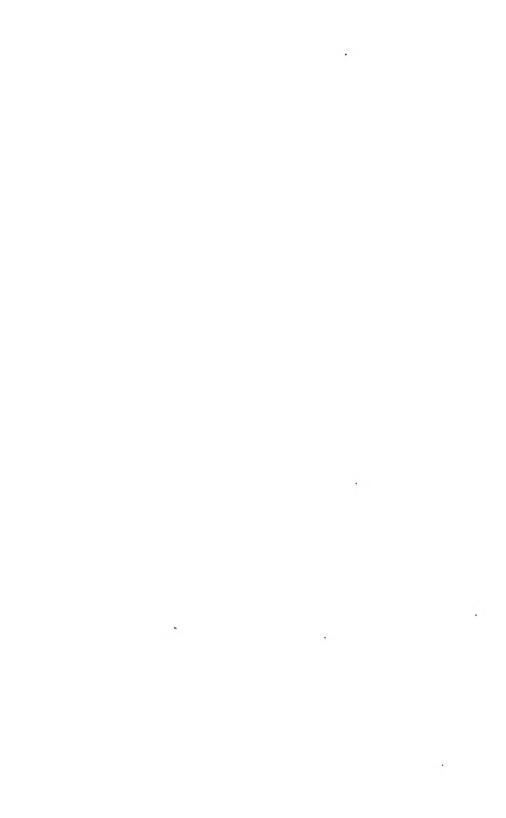


Fig. 11.—Final adjustment of the flap. Note the relative positions of A and B. The final sutures are still to be tied.

Note the position of the gauze drain, which is left in twenty-four hours.



instrument, until the close of the operation, presenting, therefore, much less danger of such infection than wounds that may have been wide open for hours.

In exploratory incisions such as I have described, instruments should be changed, and the wound leading to the disease temporarily closed by suture or packed with gauze, so as to protect the operation wound as thoroughly as it is possible to do under the circumstances.*

^{*}A portion of this series, consisting of seventy-two cases, was published in the Boston Medical and Surgical Journal, August 25, 1898. Two new cases have since been inserted in this list, i.e., No. 20, a "cure," and No. 30, a late recurrence. Twenty-six new cases have been added. Some details as to the history of the cases can be found in this article. With the slight changes above mentioned, the numbers correspond.

MODERN BULLET WOUNDS.

BY FRANK W. FOXWORTHY, M.D.,

OF INDIANAPOLIS,

Ex-Captain and Assistant Surgeon, 160th Indiana Volunteers, 34th United States Volunteers, and Acting Assistant Surgeon, United States Army.

THE history of bullet wounds is being rewritten each day as the Russian-Japanese War progresses.

The experience on such a large scale gained in this war will settle the theories as to the effects of modern bullets which were advanced during the Spanish-American and South African Wars. The Filipino insurrection was but a transition period in which the effects of the old bullets could be contrasted with the new.

All the great powers have laid aside the soft lead, large-sized bullets used in the Springfield, Martini, and Remington rifles, and are now using the small caliber, nickel-jacketed bullet with smokeless powder. And though the rifle may differ as to name, be it the Krag-Jorgenson, Lee-Medford, Mannlicher, Mauser, Mouzin, or Arisaka, yet the wounds produced are the same.

Russia has armed her land forces with a rifle designed by Colonel Mossine (or Mouzin) which is similar to the Mauser. It has four grooves and gives an initial velocity of 2075 feet. The magazine box is vertical under a receiver attached to the trigger guard, has no cut off, and holds five cartridges, which are introduced from a clip. The bullets are of hardened lead with cupro-steel envelopes and weigh 310 grains. The caliber is .275 inch; range, 2096 yards; pitch of trajectory at 1970 feet is seventy-two feet. Smokeless powder is used. The naval forces are armed with this same rifle of 1891 design and also with the Lee straight-pull, caliber .236 inch, which is the smallest caliber in use in any army.

Japan has part of her army supplied with the Murata rifle, which is constructed on the unwieldy fixed magazine tube sys-

tem, and has a range of 2187 yards. This rifle has a tubular magazine under the barrel, holds eight cartridges, and is charged through a receiver, a single cartridge at a time. It weighs over eleven pounds when loaded and has a caliber of .315 inch. The majority of the Japanese troops are equipped with the rifle designed by Colonel Arisaka, type of 1897, which is made in Japan, and is almost identical with a Mauser rifle, though a little superior to it. It has a .25-inch caliber, with six grooves, an initial velocity of 2378 feet, and pitch of trajectory at 500 yards of only 3.87 feet. It holds five cartridges in the magazine, which are introduced on a clip. The range is 2500 metres. The bullet is of hardened lead with a German-silver jacket and weighs 158 grains. Smokeless powder is used.

In comparing the rifles of the two armies, it is easily seen that Japan has a smaller bullet with greater penetration, flatter trajectory, and greater range. Yet the difference is very little if the wounds produced are compared, as all high-velocity small-caliber bullets give practically the same wounds, according to my experience with Mauser and Krag wounds in Cuba, the Philippines, and China.

The chief interest to the surgeon in war wounds centres about the high-velocity bullet, and its effect on the human system. The wounds produced by it can be better understood if the chief points of difference between the new and old rifles are remembered. 1st, The increased velocity; 2d, decreased caliber; 3d, shape and weight of the bullet; 4th, construction of it; 5th, addition of a magazine; 6th, the use of smokeless powder. These changes have produced increased rapidity of fire, increased range, a flat trajectory, and thereby an increased danger zone. The increased velocity has no practical bearing on wounds in the soft tissues, and its most obvious ill effects are seen in the different parts of the nervous system, according to Makin's experiences in the South African War, but a notable exception must be made in the case of brain wounds, for in many cases of men shot in the head, and found dead on the field. I have seen the entire brain tissue pulpified. The skull bones, however, were the cause of this, as the greater effect of

the high-velocity bullet was seen in the high resistant structures,—the bones and their contiguous soft parts.; the velocity being imparted to the bones, and by them to their surroundings. The decreased caliber makes a smaller wound, and a smaller area means less resistance on the part of the tissues, and thereby less stunning effect. The shape of the bullet offers less resistance, and thus gives greater penetration, too. The hard mantle used in its construction renders alteration either without or within the body more difficult, making lacerating wounds rare, and restraining the bullet from leaving in the tissues detached fragments. The addition of a magazine, smokeless powder, the increased rapidity of fire, and lengthened range, all tend to decrease the number of sword and bayonet wounds, as the engaging sides can rarely get close enough for their use. The trajectory or curved flight of the bullet is flatter than in the old style. The high-velocity bullet when fired from the rifle at the shoulder, which rifle has been sighted to 500 yards, can cover some part of the standing man the whole extent of its flight. This vastly increases the danger zone, and therefore increases the number of the wounded.

In dealing with the general character and nature of wounds caused by this high-velocity projectile, two classes are easily apparent. (1) Those injuries from the direct effect of the bullet on the tissues in which it comes in contact. (2) Those injuries resulting from indirect or remote effect by the transmission of the force of the bullet laterally to surrounding tissues and organs. This latter class, if the hydrodynamic theory is correct, is caused by the bullet displacing the fluid in the tissue cells, and transmitting a wave effect through the neighboring parts. Stephenson, in his "Wounds in War," has an excellent defence of this theory, illustrating it by the effect of a highvelocity bullet on a closed leaden can filled with water, which badly shatters the can by the effect of the waves of water generated thereby. The tissues and covering of the brain are analogous to this closed can and its contents, and the effect is generally the same.

Reverting to the first class—the direct effect on the tissues.



Fig. 1.—Case I. Entrance wound, Mauser bullet, undeformed, distance less than fifty yards. Left ankle.

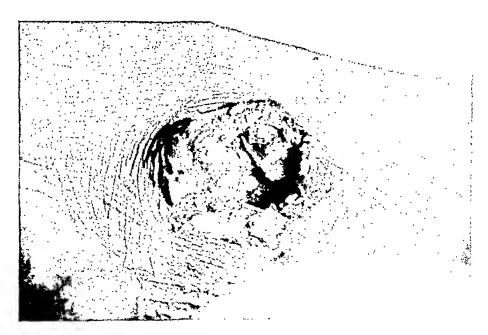


Fig. 2.—Case I. Exit wound, Mauser bullet, undeformed, distance less than fifty yard: Left ankle. Shows explosive effect at short range.

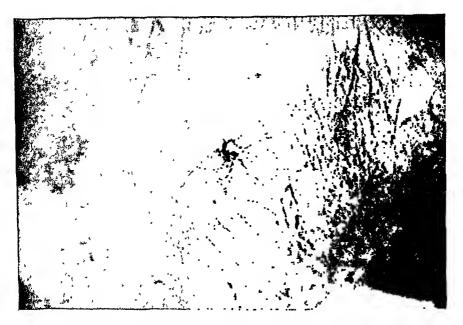


Fig. 3—Case III. Stellate entrance wound, Krag bullet, undeformed, distance less than fifty yards. Right ankle.



Fig. 4.—Case IV. Entrance wound, Krag bullet, undeformed, right knee, distance less than fifty yards.



Fig. 5.—Case IV. Exit wound, Krag bullet, undeformed, near popliteal space right linee, distance less than fifty yards.

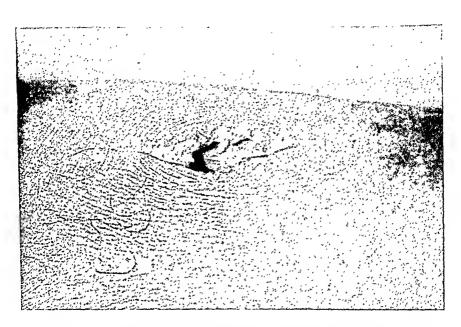


Fig. 6.—Case II. Entrance wound, Mauser bullet, undeformed, distance less than fifty yards. Over left tibia. Notice splitting of skin, not caused by bullet, but by fragments of bone flying upward, and, as but little flesh being between skin and tibia, the skin is split by them. Illustrated by ends of a board flying up when board is broken in the middle. Notice X-ray picture of this.

the entrance wound is often described as having a punched-in look. It is more a punctured or perforating injury than those seen in the Civil War. When the bullet impinges at right angles to the body the entrance is circular, and slightly less in diameter than the projectile. The edges for a small fraction of an inch are discolored, and the skin has a contused look. However, when the wound has been received at a very short distance, or at the extreme range, the entrance wound I often found to be larger than the diameter of the bullet. In Case No. 6 of the sixty-nine killed and wounded in the attack on Laoag, Luzon, April 17, 1900, the entrance aperture was nearly an inch in diameter in the right axilla. It was received at a distance of less than fifty yards. The wound was circular, made by a Krag bullet, and was undoubtedly the wound of entrance, as in its exit the bullet blew off the top of the skull. This has been explained to me by ordnance officers in the army, that the bullet in its first few yards of flight has not yet steadied itself, and its axis of rotation has not become parallel to the line of its trajectory, as only the last half of the bullet is caught up by the rifling of the gun-barrel. This may be the true explanation. At extreme range the wound of entrance is also larger than the diameter of the bullet. Ordnance officers also give the causes for this in the tendency to wabble when the bullet has lost almost all its velocity and rotation. An example of that is the case of a private of the Thirty-third United States Infantry at Tagnadin Pass, whose wound of entrance was over threefourths of an inch in diameter and circular. It was received at a distance of over 2000 yards, and must have been near the extreme range of the bullet, as it lodged in the brain substance. Nancrede gives the true explanation of the lodgement and deflection of the majority of modern small-arm projectiles as due to the laws of physics and ballistics, and not due to ricochet: the hypothesis being that from 1000 yards to 1500 yards the bullet tends to revolve on its short axis and is thereby easily deflected. (See Figs. 1, 2, 3, 4, 5, and 6.)

Wounds of entrance are atypical, also when received at an angle or from ricochet. Out of sixty-nine dead and wounded

at the battle of Laoag, thirty had atypical wounds of entrance. As the fighting was at short distance, few of these were ricochet wounds, and the bullet had entered at an angle, sometimes scoring the skin for several inches before penetrating it. Ricochet wounds are contused and lacerated, as well as multiple, as a rule, and in many instances stones, gravel, and dirt are carried in by the bullet or its fragments. For four months in the spring of 1900, I occupied my leisure moments in extracting gravel and bullet fragments from the multiple wounds in the hips of a teamster wounded by ricochet, by the accidental discharge of a Krag at a distance of ten feet, the man having been standing in a gravel road. It is needless to add that suppuration is to be expected in such cases.

Exit apertures vary widely. The skin being unsupported on the exterior accounts partially for the exit being larger than the entrance. At normal velocity the exit aperture often resembles the entrance so closely as to be difficult of differentiation. At low velocity, it may be a mere slit, so small as to defy discovery.

Senn, in his Lane lectures in San Francisco, July, 1899, told of a case in which he had opened the knee-joint for a retained bullet, as he could find no exit. As nothing could be found in the joint, diligent search over the popliteal space revealed a slit in the skin but one-half inch long, which he had overlooked, much to his disgust. A proper use of the Röntgen ray obviates such needless operations. When the bullet emerges through the skin very obliquely, a long ditch-like wound results, much wider than one would suppose, and very intractable in healing. Unlike the slit exit, the skin retracts, leaving a gaping wound. At the engagement at Vigan, Luzon, December 5, 1899, an insurgent soldier, lying down behind the stone fence at the hospital, raised his head to look out. bullet struck him on the top of his head, raised a thin plate of bone, with adherent scalp, and passed out near the occipital prominence. The wounds of entrance and exit were long ovals, and a gutter fracture of the skull resulted without brain lesion. Not only were the wounds months in healing, but the

intervening bridge of scalp sloughed off, and I removed a thin plate of bone covering about one square inch before resolution would take place. The horrible wounds of exit, due to the supposed explosive bullets, or to lesions of bone forcing the internal tissues through the skin, will be spoken of under the effect on bones.

The track of a normal bullet through the body is straight. The high-velocity bullet does not run along the ribs, and play hide and seek in the body as the old has done. A private of the First Nebraska Regiment, wounded in the Philippines, came under my care in June, 1899. He had two oval scars, the first at right angles to the axis of the body, near the left anterior superior spinous process; the other parallel to the axis of the body just below the umbilicus. He informed me that the surgeon had told him that the ball had been deflected at almost a right angle from the pubic bone, and for several weeks he had discoloration of the skin over this angling track. My own experiences lead me to believe that such a course for a highvelocity bullet is impossible. Through muscular tissue this bullet slits and tears, perforates cancellous bone, splinters and comminutes dense bone, and bites out pieces of nerves and blood-vessels. A hard, fibrous cord marks its track after healing.

Localizing the bullet wounds, and at the same time noting the indirect effect of a bullet on the tissues concerned, injuries of the head may well be dealt with first. The surgeons of the Portland Field Hospital in the South African War remarked that "wounds of the head still continue to be the most fatal of all the injuries received on the battle-field." Of the 305 United States soldiers killed in action in China and the Philippines for the year ending June 30, 1901, seventy-eight had fracture of the skull. This number of fatalities was only exceeded by penetrating wounds of the thorax, which caused 101 deaths. In the Civil War, 57 per cent. of all gunshot fractures of the head were fatal. In the Spanish-American War, as near as I can learn, 64 per cent. were fatal. According to the Surgeon-General's report for the year ending June 30, 1901, 94 per cent. of all

gunshot fractures of the head received in action died. This would seem to imply that, notwithstanding antiseptic treatment, the modern bullet is not as humane in skull injuries as the old. The reason of this is the explosive action on bone and on cavities filled with fluids or semifluids. This action is noted in distances less than 500 yards approximately. Forwood speaks of the fact that after 1600 metres clean perforations of the skull occur. Freer cites the case of a Mauser bullet at 1000 yards penetrating the centre of the forehead and emerging at the right temple. Entrance and exit wounds were clean-drilled holes. The patient was convalescent in three months. At extreme range the bullet is humane. At the general hospital in Old Point Comfort, July, 1899, I examined a negro soldier who, at the battle of Santiago, had been shot by a Mauser bullet at over 1500 yards, which penetrated his skull from occiput to the ramus of the jaw. Some paralysis at first was present, which at the time I saw him had entirely disappeared. It seems improbable that the same kind of bullets could cause the following injuries, which were taken from my case-book, occurring at the battle of Laoag, Luzon, P. I., April 17, 1900.

CASE No. 6.—Native Filipino, found dead shortly after the fight; distance shot less than fifty yards. Entrance wound about one inch in diameter in right axilla. Exit, whole rear of the head blown out, cranial contents gone from parietal to parietal, all gone clear down to the base of the skull.

CASE No. 7.—Native Filipino, dead. Distance, probably less than 100 yards. Entrance wound three-fourths of an inch by three-fourths of an inch centre right ear. Exit, the entire left side of head including ear gone, with fracture and displacement of all the rest of the bones of the skull, as well as malar and superior maxillary of left side of face.

I have records of other cases almost as severe as these two cited. These were all produced by Krag bullets undeformed, and not filed at the apex to render them explosive. The terrible injuries to the skull lead many to believe that the bullets had been tampered with, but, as close inspection was made of our

ammunition before the fight, it must have resulted from the velocity of the bullet alone. "Gutter" fractures, or those resulting when the bullet chips up a portion of the bone, leaving a neat "gutter" behind, are rare, and also rarely fatal, as in the case cited. The gunshot fractures in the Boer War have generally been received at long range, and consequently do not show the explosive effects as seen in the Philippines, where such wounds were usually at short range, due to ambuscades.

Von Bergmann tersely sums up the head injuries as follows: At fifty metres the scalp is preserved and continues to hold the skull together, though the latter is broken into many fragments. At 100 metres the destruction of the skull is somewhat less, though two zones of comminution can be grouped around the wounds of entrance and exit. At increasing range the damage decreases. At 1800 metres and upward we have clean-cut bullet-holes. At 2700 metres the bullet remains embedded in the brain.

Wounds of the face gave little trouble unless some important nerve was cut, as the bone and cavity conditions were absent. However, when the inferior maxillary bone was involved, much annoyance was often caused by the non-union of the fragments, as in the case of Captain Gibson of my own regiment, where excessive destruction of this bone left him with a useless lower jaw. Retained bullets in the face were sometimes found.

Borden reports a case of a private in the First Nebraska Regiment with retained bullet in right antrum of Highmore; localization by X-ray and recovery. This case came under my observation at the United States General Hospital, San Francisco, June, 1899. Ankylosis of the jaw and retinitis with atrophy of right eye were present. An unsuccessful attempt, after two radiographs had been made, to remove the bullet was followed by its complete removal August 16, 1899, by Major A. C. Gerard, Surgeon, United States Army. Bullet was found to be a deformed Remington. The last time I saw the case was September 7, 1899, when almost complete recovery had taken place. The patient, however, at that time was suffering far more from an

X-ray burn six inches in diameter than he had from the presence of the bullet. Borden also reports a case of lodged bullet in the brain with recovery. From conversation with many army surgeons, I am led to believe that recoveries are exceedingly rare in such cases. In the one case I had, a private in the Thirty-third Infantry, at the battle of Tagnadin Pass, December 4, 1899, death took place within twenty-four hours. The distance was nearly 2000 yards; entrance over fissure of Rolando, left side, bullet presumably had passed towards the base of brain, and was not found. Patient unconscious from the receipt of injury with total paralysis of right side. The bullet had penetrated so deeply and the condition of the patient such that it was not followed to its lodgement.

Wounds of the neck were of the gravest importance on account of the large blood-vessels and nerves there. Some of the narrowest escapes occurred in this region. This class will be noticed under wounds to blood-vessels and nerves.

Wounds of the chest have not been given sufficient prominence by the writers on high-velocity projectiles, I believe, and my statement is based on the Surgeon-General's report for the year ending June 30, 1901, that the largest number of deaths in action—101—were due to wounds in the chest. So many marvellous recoveries have been recorded that one is apt to forget that such injured usually die on the field of action. they live long enough to reach a hospital, the great majority, nearly 80 per cent., recover. The percentage of mortality in the Civil War, of penetrating wounds of the chest, was 65 per cent. I am unable to get accurate figures for the Spanish-American or Boer Wars, though Greenleaf, in the former, reports twentyfour cases, with nine deaths, or 37 per cent. fatal. These do not, I believe, include any found dead on the field from chest wounds. In 1901, in the Philippines, of all penetrating wounds of the chest in action, 74 per cent. were fatal. The wounds may be divided into two classes. (1) Those of bronchi and lungs. (2) Those of heart and blood-vessels. The first are numerous, and rarely fatal unless the root of the lung is involved, in which case most of the patients succumbed on the field; or in those

cases where the bullet was lodged in the lung tissue. Repeatedly have I seen men shot anteroposteriorly, and have little hæmoptysis and slight hæmothorax, the wound closing up beautifully, with no infection or untoward symptoms. The celebrated case reported by the surgeons of the Portland Field Hospital in the Boer War shows what a slight shock these bullets make: "A man, whilst firing in the prone position, felt his pipe break in his breeches pocket, and presently put his hand down to feel what had happened. He withdrew his broken pipe, and also a bullet, and then finding some blood on his hand, thought he must have been wounded. As it turned out, he had been hit by a bullet, which entered the shoulder and traversed the lung and abdomen, and yet had caused him no pain or sense of injury."

Lodged bullets give rise to much pain and often severe hæmorrhage. A soldier under my care, in the United States General Hospital at San Francisco, had one lodged in the upper lobe of his right lung, according to the radiograph. At recurring intervals, about ten days apart, he would be seized with a violent pain, and a severe hæmorrhage through the mouth would ensue. He grew weaker and weaker and probably died, though I was unable to follow the case through on account of orders for foreign service. Pain in breathing was also noticed in those cases where ribs were fractured.

Wounds of the heart and large blood-vessels of the chest were seen in autopsies only. I have seen one man with a wound one inch above the left nipple, and also saw one in a similar place below the left nipple, and no symptoms of involvement of the heart. Recoveries uneventful in both cases.

Wounds of the spine were similar to those seen in our civilian hospitals, and little could be done for them. The inevitable resulting paralysis and decubitus rendering the patient a burden to himself and all concerned. The bony column surrounding the cord gave a high-velocity bullet awful opportunity for explosive effect. Sixty-two per cent. in the Spanish-American War were fatal, which is 7 per cent. more than in the Civil War.

Wounds of the abdomen have caused much discussion and many differences of opinion. They still remain of the gravest character, and are far more fatal than the hospital records show. Ninety-one per cent. of those soldiers with penetrating abdominal bullet wounds in the year 1901 in our army were fatal. Of those who survived long enough to be carried to a hospital, 80 per cent. of these were fatal. At the battle of Laoag, Luzon, thirty-three of its sixty-nine killed and wounded had penetrating abdominal wounds. Twenty-six of these died before I could see them. The remaining seven died within seventy-two hours. It is exceedingly exasperating to see these cases passing away, no matter whether conservative or operative treatment is used. Of the organs wounded, the spleen produced death quicker than any other, which was undoubtedly due to hæmorrhage. The liver would allow perforation, providing the large blood-vessels were not touched. The only case of recovery in my own practice from penetrating wounds of the abdomen was of this class:

A Filipino woman was walking along the streets of Laoag, Luzon, in October, 1900. A native scout, twelve feet away from her, in cleaning his Krag carbine accidentally discharged it. The bullet entered the woman's abdomen, right side, immediately beneath the eighth rib, at the edge of the rectus abdominalis, and passing backward and to the right emerged in the same transverse plane two inches posterior to the axillary line. For a week her temperature was over 102° F., at the end of which time it gradually fell to normal, with uneventful recovery. The entrance and exit wounds were small and quickly healed. No surgical interference was used.

Wounds of the stomach were not so fatal as those of the intestines, though in my own experience I have never seen a recovery. Senn's theory that wounds above the umbilicus were favorable for recovery was not always upheld by the surgeons who examined the dead on the battle-field. When the small intestines were perforated, death invariably resulted. Makin

reports in the South African War that all the cases in which perforation was diagnosed in the hospital resulted fatally, and that undoubtedly, of the cases that recovered spontaneously, the injury was not of a perforating nature. Watson Cheyne, in British Medical Journal, May 12, 1900, reports, from his own experience with wounds of the abdomen, "that the results were not nearly so good as he had been led to believe." The surgeons of the Portland Field Hospital also report that "far too favorable an opinion has been formed of the results of such injuries." On the other hand, in the Spanish-American War there were forty-four penetrating wounds of the abdomen with thirty recoveries. Ojuna reports that 70 per cent. of the Spanish soldiers wounded in the chest and abdomen in the battle of Santiago recovered. He evidently includes non-penetrating wounds in his statement, which materially lessens its value. Robinson reports twenty recoveries out of forty-five cases received at the First Reserve Hospital, Manila. This latter report is misleading, as it does not state out of how many hundreds of cases of abdominal injuries were these forty-five culled. Many of these were undoubtedly on the road to recovery before being shipped to Manila, as the First Reserve Hospital was miles, and sometimes hundreds of miles, from where the wound was received. As Bowlby, the English surgeon, in commenting on Robinson's statement, says, "From what we have been able to learn, we are of the opinion that a considerable number of men shot through the abdomen die very quickly, or within a few hours; and we think that the patients who were seen at the Base Hospitals" (as was the First Reserve) "were to be regarded as men who had either escaped injury of the bowels and bleeding into the peritoneum, or in whom the perforation of the intestines had not been followed by its usual complications. They represented the few survivors of a large number of men who had died from wounds of the abdomen, implicating the small intestines, and were not to be regarded as in any way illustrative of the usual results of such injuries." Transverse and oblique wounds of the intestines were always fatal.

Wounds of the large intestine were not as fatal as those of the small. The denser muscular coat assisted in closure of the opening. Also the conditions in the large intestines seemed better for a localized peritonitis and circumscribed abscess similar to those of appendiceal origin. Therefore wounds in the lumbar region were not considered so serious as those nearer the centre of the abdomen.

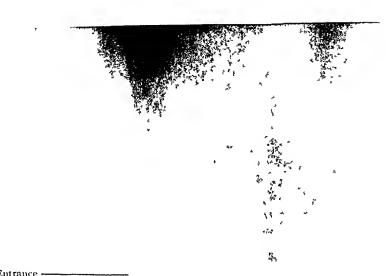
Wounds of the kidney caused little trouble, and with fatalities about the same as wounds through the extremities. Through the bladder trouble was experienced from extravasation of urine. These injuries were not considered very fatal.

Recapitulating, we find the consensus of English and American surgeons placing abdominal wounds as regarding fatality in the following order: (1) Spleen wounds most fatal of all. (2) Perforating wounds of the small intestine and mesentery. These were more liable in the transverse and oblique passages of the bullet through abdomen. (3) Wounds of the stomach. (4) Wounds of the large intestine. (5) Wounds of bladder. (6) Wounds of liver. (7) Wounds of kidney. (8) Non-perforating wounds of the intestine; the least fatal of all. As a general rule, from the statistics I have examined, I would suggest that, excepting splenic wounds, the mortality of penetrating, anteroposterior abdominal wounds is in inverse ratio to distance from centre of abdomen. In other words, the farther from the centre the greater chance of recovery.

Wounds of bone (Figs. 7, 8, 9, 10), especially those of the long bones, are important from the explosive effect which is here seen. The bones of the skull enclosing the brain give the worst effects. McCormac, in the Lancet, August 3, 1895, says, "Explosive effect is due to rapid arrest of the flight of the bullet on piercing fluid matter, and its motion being transferred to parts immediately surrounding, and these again to parts further removed, somewhat as wave circles by throwing a stone into water." This view has been modified since 1895. Schachner, in Annals of Surgery, January, 1900, says, "Explosive



Fig. 7.—Case II. Mauser bullet, undeformed, middle of lower leg, entrance directly over tibia, showing comminution of the same.



Entrance -

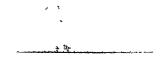


Fig. 8—Case II Mauser bullet, undeformed, middle of lower leg, entrance directly over tibia, showing comminution of the same.

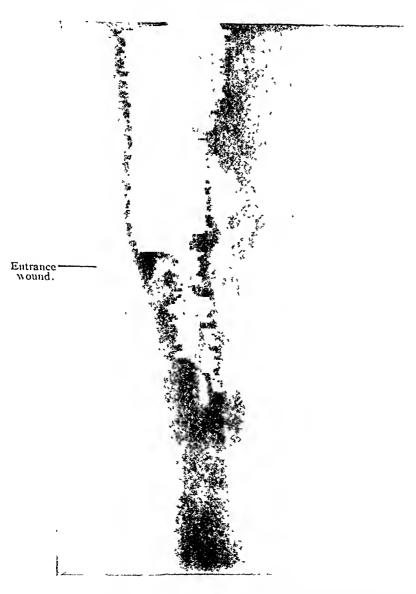
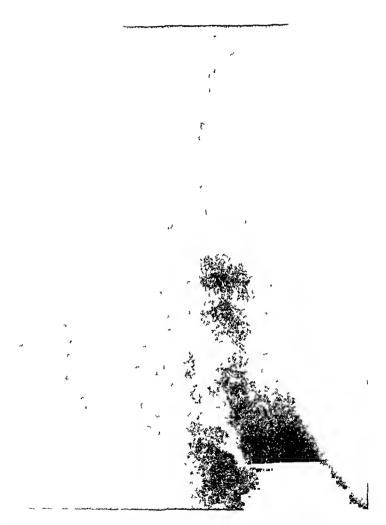


Fig. 9—Case II. Mauser bullet, undeformed, middle of lower leg, entrance directly over tibia, showing communion of the same



 $\Gamma \mbox{\scriptsize IG}$ 10 —Case I.—Mauser bullet undeformed through the malleon at distance of less than fifty yards

action is due to the deformation of bullet, range, and character of tissue." He places the range at anything less than 1000 yards. My own experience leads me to believe that the explosive action is due to short range, a hard bone, and soft tissues on the distal side of the bone. The cases of skull injury cited before uphold this theory.

Another case also, Juan Aguinaldo, sergeant of insurgents, shot by Krag carbine, July 7, 1900, at Pasuchin, Luzon. Distance 125 yards. Entrance wound, one-half inch by one-half inch, typical, three inches below internal condyle right femur, course downward and outward, fracturing both tibia and fibula, comminuting the former, so that not a piece three inches long remained. Exit, the whole external surface of the leg, blowing out much of the muscular tissue, and what remained was filled with spicules of bone. The comminution of bone was so extensive, amputation was advised, which I did under spinal anæsthesia, July 8, 1900, the first use of subarachnoid anæsthesia in the Philippines.

Robinson saw twenty-four cases of explosive effect out of 462 cases of bone wounds; all were in long bones or calvarium, and not at extreme range. Von Bergmann, in speaking of wounds of the extremities, remarks that "the wound of exit is usually small, even at close range." This theory is at variance with the experience of American surgeons, who often found a large wound of exit at short range especially. Explosive action can also be due to the filing of the hard apex until the soft core of the bullet is reached. This is then called a "soft-nosed bullet," and "mushrooms" upon striking the harder tissues.

Forwood believes that bullet wounds in bone beyond 600 yards give clean perforations without splintering, especially in spongy bone; while Senn remarks that extensive comminution of bone exists when the distance is within 500 yards; perforation and no splitting in the next 500 yards, and beyond that comminution. English authors do not agree with him, but affirm that the comminuting effect diminishes as the veloc-

ity decreases, and that perforations occur in cancellous bone at any distance, but rarely in the shaft of the long bones. After seeing several hundred cases of bone injuries, I have yet to see a perforation alone except in cancellous bone. In comparison with Civil War wounds we had less transverse fracturing, more longitudinal splintering, the explosive effect in exit wound, the striking contrast of extreme comminution of dense bone, and simple perforation of cancellous, and, finally, the ease with which these wounds healed without amputation. In the Civil War the injuries to extremities showed a fatality of 19 per cent.; in the Spanish-American War but 1.8 per cent.; a decided gain due to high-velocity bullet, aseptic and conservative surgery.

Wounds of the joints made by the small caliber bullet were not much more serious than uncomplicated wounds of soft parts, the cancellous tissue of the joint allowing perforation instead of comminution. Nancrede states there were 161 gunshot wounds of the large joints in the Spanish-American War; seven amputations and one resection made, and only ten deaths out of the entire number wounded. This gives a mortality of 6 per cent. of all cases operated on or not, which is quite different from the records of the Civil War, which of the knee-joint alone treated conservatively shows a mortality of 60 per cent., which percentage would be increased if those operated upon were added. Frederick Smith, however, thinks that, while injuries to the knee-joint have been benefited by the small-caliber bullet, the injuries to the ankle- and wrist-joints are about as bad as with the old bullet. Yet the fact remains that joint injuries are not the serious lesions they were with the old-style bullet.

Blood-vessels have shown a marvellous capacity to escape injury. Makin thinks that this may be due to an effect similar to that seen in a limited train which has been known to throw articles off the track without touching them,—the air in front of it acting as a buffer. Hæmorrhage from the perforated vessels has not been as severe as expected.

I saw one case of the external carotid perforated in an officer; the common carotid was ligated, recovery followed. Another case was that of a native. The external carotid artery and internal jugular vein were both perforated. Ligation in this case did not save him, as several hours had elapsed before I saw the case, and too much hæmorrhage had ensued. The best example, though, is the case of private Saiter, Twelfth Infantry, from Evansville, Indiana. This man was shot from ambush, and, being deserted by his comrades, crawled into the bushes several hundred yards away, and lay there sometime before being found. When brought into the hospital, I found a typical entrance wound, middle external surface, right thigh. Exit, typical at posterior edge, inner condyle of right femur. Diagnosis, perforation of femoral artery in Hunter's canal. Every effort was made to establish collateral circulation without success, and after a week the leg presented that classical color and condition seen when both afferent and efferent blood-vessels are occluded. I amputated at the lower third of the thigh, and found that both vein and artery had been entirely cut through, clots being found in both. It was peculiar to me that fatal hæmorrhage had not occurred at the time of injury, or during the subsequent movements in crawling. Recovery occurred, and patient sent to Evansville.

Aneurisms frequently occurred with the usual involvement of contiguous vessels and structures. The one case I had will be reported under nerve injuries.

Injuries to the nerves occurred with great frequency, both in our own wars and also in the South African campaign. As most of them were concussion and contusion, the resulting paralysis, as a rule, gradually diminished, and in most cases vanished completely. Senn reports one of the cases under my care in his "Practical Surgery."

A hospital corps man was shot at Malabon, Luzon. Entrance wound just below the level of the right shoulder-joint on axillary side of the scapula. Exit, anteriorly, base of axilla and inner border pectoralis major muscle. Paralysis complete from the start. An egg-shaped swelling soon appeared in axilla. Diagnosis, aneurism axillary artery, third portion. When under my

care in June and July, 1899, at the Presidio, San Francisco, the aneurism was compressible, and I recommended ligation. The patient was prepared for operation, but Dr. Senn decided to wait, hoping to have the functions of the nerves involved restored in time without surgical interference. When I last heard of the case in September, 1899, the functions of the median nerve had been re-established, but not those of the ulnar.

The treatment of the bullet wounds has been carefully avoided in this paper, for, as a general rule, they should be treated exactly as those we have in our civil hospitals here at home. However, my own experience, supplemented by the experience of other army surgeons, caused me to always cut down on a large-sized low-velocity bullet, as the Remington, if possible, and lay its track wide open on account of the attendant infection. Also, to leave a small-sized high-velocity bullet alone, hoping it may become encysted. Scores of such bullets are being carried about to-day without any trouble. One of my cases, which Dr. Senn has also reported, has a bullet lying close against the rectum one and a half inches above the sphincter. A radiograph found it there, though the point of entrance was just above the popliteal space. It causes him no trouble at all. Borden reports a case of a soldier who still carries a bullet in the brain without irritation of any kind. Another observation is the enormous recuperative power of bone tissue after gunshot injuries. Very rarely is amputation justifiable. Formerly, it was thought best to amputate in wounds of the joints, but under antiseptic treatment it is rarely, if ever, needed.

The treatment of bullet wounds of the abdomen in war has not been satisfactory from a surgical stand-point. Every one operated on in the Spanish-American War died. Nearly all operated on in the Boer War were fatal. It is impossible to do the patient justice on the battle-field; and while such operations should be performed in civil hospitals where conditions are favorable, so far we have not been able to conduct such operations with success on the field of action, and by the

time the patient is transported to the Base Hospital he has passed the operating time. Conservative treatment alone has given the best results, according to the majority of army surgeons. Gibson insists on the expectant treatment because those who had penetrating wounds of the chest or the abdomen and got well were treated that way. Flagg mentions the fact that for the three years ending June 30, 1901, of the sixteen laparotomies for perforating gunshot wounds of the abdomen in the army, thirteen died. Makin, in his South African experience, notes that, of six bullet perforations of abdomen operated on from three to four days after being wounded, only one recovered; that it was better to operate inside of twelve hours or not at all; that it is better to operate before transportation than afterwards. In nine cases diagnosed as perforations of abdomen and not operated on four recovered, giving a mortality of 831/3 per cent. for those operated on, and 555/8 per cent. for those treated expectantly without operation. Nancrede is "opposed to operating in the field except under circumstances too exceptional to be noted." Senn straddles the question by stating that there should be "immediate operative treatment of gunshot wounds of the abdomen where hæmorrhage or fatal lesions dictate such a course." Forwood decides on immediate operation or not at all, as wounds of the viscera do not admit of delay. Borden gives forty-four as the total number of penetrating wounds in Spanish-American war, of which number four were operated on, with a mortality of 100 per cent. the forty unoperated on there was a mortality of 62½ per cent., and he summarizes "Laparotomy should only be used in those cases in which the surgeon is sure death will occur without it." In the three cases operated on by Banister two died, while the one with a revolver wound recovered. Hildebrand explains some of the mortality in the South African War in that "Not a single case of penetrating wound of the abdomen was operated on in less than three days." Probably such statements as that encourage surgeons like Harris, who believes in drainage and operation in all cases of penetrating wounds of the abdomen. La Garde trusts in the simple aseptic dressing as the best.

Treves has formulated the following rules, which are the clearest and most concise that I have found. In penetrating abdominal bullet wounds he advises operation if (1) Patient is seen before seven hours have elapsed. (2) Patient has had an empty stomach when wounded. (3) Patient has had a short and easy transport. He advises non-interference if (1) Patient not seen until seven hours have elapsed. (2) There has been a long and tedious transport. (3) Patient has been wounded soon after a meal. (4) The liver, spleen, or kidney be wounded. (5) It be a transverse or oblique wound above the umbilicus. (6) The bullet is retained. (7) The wound be below umbilicus, as in this locality the patients generally get along all right. (8) The colon alone be implicated (except the transverse). "It comes to this, that the cases that are suited for abdominal section on the field are, roughly, exceedingly few." Poey hits the nail on the head when he says "Less surgical interference, the better the results ultimately; common sense and antiseptic treatment will do more than all the surgical operations possible."

No less an authority than MacCormac says, "The treatment of the larger portion of Mauser wounds is generally of the expectant kind, and this is especially true of abdominal wounds. But in every region of the body, the percentage of cases terminating fatally is diminished."

That the modern rifle is more humane than the old can no longer be doubted. In the Civil War there was one man killed to every 4.5 wounded; in the Spanish-American and Philippine Wars there was one man killed to every 7.4 wounded. The Civil War has a mortality of the wounded of 13 per cent. The Spanish-American cut this percentage in two, and the records of the hospitals in the Philippines reduced this nearly one-half. In the North China campaign there was a mortality of the wounded in the Japanese army of 3.2 per cent. It is to be hoped that when the accurate statistics of the Russian-Japanese War are published that even this small percentage will be diminished.

From my own experience in Cuba, the Philippines, and China, and from the published records of surgeons who have participated in active campaigns, the modern bullet is humane. And it seems to me that the treatment should be humane, too, which should seldom be operative, but usually an asentic conservatism.

BIBLIOGRAPHY.

Abbot, Francis C. Lancet, 1899, Vol. i, pp. 80, 152.

Abell, George C. Medical Brief, June, 1904, p. 562.

Banister, J. M. Journal of American Medical Association, Vol. xlii, p.

Barrow, H. P. W. British Medical Journal, 1901, Vol. i, p. 268.

Beevor, Major. British Medical Journal, 1899, Vol. ii, p. 1063.

Bell, Robert E. Boston Medical and Surgical Journal, 1898, Vol. cxxxix, p. 123.

Bergmann, E. von. System of Practical Surgery, Vol. i, p. 113; Vol. iii, p. 547.

Beyer, H. G. Journal of Boston Society Medical Science, Vol. iii, p. 117.

Boston Medical and Surgical Journal, Editorial, 1899, May 4.

Bowlby, Anthony A. Civilian Field Hospital.

Boyd, Robert. British Medical Journal, 1903, Vol. i, p. 1182.

Borden, W. C. New York Medical Journal, 1900, Vol. lxxi, pp. 448, 498, 543.

Borden, W. C. Sander's Prize Essay on Military Surgery, 1900.

Borden, W. C. Use of the Röntgen Ray in the United States Army in the Spanish-American War, pp. 20-25, 30-36, 42-44, 83, 84.

Bruns, P. von. Archiv für klinische Chirurgie, 1899, Band Ivii, p. 602.

Campbell, Wm. F. Medical News, 1898, Vol. lxxiii, p. 577.

Carpenter, D. N. Medical News, Vol. Ixxiii, p. 176.

Cheyne, W. W. British Medical Journal, 1901, Vol. ii, p. 1591.

Clement, Earnest W. Handbook of Modern Japan, p. 344.

Connor, P. C. Academy of Medicine, June 13, 1899.

Da Costa, J. C. Modern Surgery, 1903, p. 205.

Dent, Clinton T. British Medical Journal, 1900, Vol. ii, 632. Dent, Clinton T. Lancet, 1900, Vol. ii, p. 1277.

Dent, Clinton T. Lancet, 1900, Vol. i, p. 1515.

Delatour, H. B. Albany Medical Annals, Vol. xx, p. 185.

Erwin, J. J. Cleveland Medical Gazette, Vol. xiii, p. 450.

Exham, Richard. Journal of Association of Military Surgeons, 1903, Vol. xii, p. 12.

Fenner, E. D. Annals of Surgery, January, 1902, p. 15.

Finucane, M. I. Lancet, 1900, Vol. ii, p. 807.

Flagg, Charles E. B. Journal of Association of Military Surgeons, 1903, Vol. xiii, p. 255.

Forwood, W. H. Dennis's System of Surgery, pp. 191-218.

Forwood, W. H. International Text-Book of Surgery, pp. 915-943.

Freer, E. Luke. British Medical Journal, 1903, Vol. i, p. 998.

Gibson, Charles L. Annals of Surgery, May, 1902, p. 638.

Godlee, R. J. British Medical Journal, 1903, Vol. i. p. 79.

Greenleaf, Henry L. New York Medical Journal, Vol. 1xx, pp. 292, 356.

Harris, M. L. Annals of Surgery, Vol. xxxix, p. 356.

Harte, Richard H. Annals of Surgery, January, 1902, p. 112.

Havard, Valery. Journal of American Medical Association, Vol. xxxi, p. 1412.

Herz, Leopold. Der Sanitats Dienst bei der englischen Armee im Kriege gegen die Buren, 1902.

Hildebrandt. Archiv für Chirurgie, lxvii, p. 4.

Irwin, L. G. Lancet, 1902, Vol. ii, p. 1113.

Jane, Fred T. Imperial Russian Navy, p. 520.

Jerram, Charles S. Armies of the World, pp. 204, 205, 233-238.

Johnson, A. B. Annals of Surgery, Vol. xxxix, p. 798.

Keith, Arthur. Lancet, 1899, Vol. ii, p. 1499.

Klinisch Therapeutic Wochenschrift, June 20, 1899.

Law, Arthur A. Northwestern Lancet, 1903, Vol. xxiii, p. 259.

Le Conte, Charles L. Annals of Surgery, January, 1902, p. 111.

Le Garde, L. A. Medical News, 1902, Vol. 1xxx, p. 927.

Le Garde, L. A. Boston Medical and Surgical Journal, 1900, Nov. 1.

Lydston, G. F. Journal of American Medical Association, Vol. xxx, p. 1268.

MacCormac, William. Lancet, 1900, Vol. i, p. 1485.

MacCormac, William. Lancet, 1895, Vol. ii, p. 290.

MacCormac, William. British Medical Journal, August 24, 1901, p. 459.

MacCormac, William. Journal of Association of Military Surgeons, Vol. x, p. 277.

Makin, G. H. Surgical Experiences in South African War, 1899-1900.

Martin, A. A. British Medical Journal, 1903, Vol. i, p. 135.

Matas, Rudolph. Journal of American Medical Association, Vol. xxxii, p. 687.

Medical Department of Japanese Army. Journal of Association of Military Surgeons, August, 1904, p. 127.

Morrison, R. British Medical Journal, 1898, Vol. ii, p. 1481.

Nancrede, Charles B. Transactions of American Surgical Association, Vol. xvii, p. 43.

Nancrede, Charles B. Journal of American Medical Association, Vol. xli, p. 67.

Nancrede, Charles B. Annals of Surgery, 1902, Vol. ii, p. 368.

Nancrede, Charles B. Journal of Association of Military Surgeons, 1903, Vol. xiii, p. 282.

New International Encyclopædia, Vol. xv, p. 930.

Nunez, T. Revista de Medicina y de Cirurgia, April 25, 1901.

Ogston, Alexander. British Medical Journal, 1898, Vol. ii, p. 813.

Ojuna, Mariano. Journal of American Medical Association, Vol. xxxi, p. 1412.

Otis, George. A. Medical and Surgical History of Civil War.

Otis, George A. Vol. i, pp. 307, 309, 452, 599-610.

Otis, George A. Vol. ii, pp. 29-208, 471.

Otis, George A. Vol. iii, pp. 65-67, 355, 367, 687-762, 869-873.

Park, R. Buffalo Medical Journal, Vol. xxxviii, p. 1.

Parker, Wm. E. Journal of American Medical Association, Vol. xxxi, p. 1468.

Poey, E. C. Journal of Association of Military Surgeons, p. 294, May, 1904.

Rigby, Hugh M. Lancet, 1899, Vol. ii, p. 1499.

Roberts, C. British Medical Journal, 1902, Vol. ii, p. 1027.

Robinson, E. F. Annals of Surgery, February, 1901, p. 113.

Rodman, William L. Annals of Surgery, January, 1902, p. 119.

Schachner, August. Annals of Surgery, January, 1900, p. 75.

Scientific American, 1904, Vol. xc, p. 390.

Scudder, Charles L. Treatment of Fractures, 1903, p. 431.

Senn, Nicholas. Practical Surgery.

Senn, Nicholas. Medico-Surgical Aspects of Spanish-American War.

Senn, Nicholas. Austin Flint Medical Journal, June, 1900.

Senn, Nicholas. National Medical Review, Vol. viii, p. 104.

Senn, Nicholas. Letters, Correspondence, and Notes on Spanish-American War, Journal of American Medical Association, 1898-1899, Vol. xxxi, pp. 46, 98, 1164, 1239, 1295, 1320, 1350, 1406.

Senn, Nicholas. Medical Record, July 30, 1898.

Senn, Nicholas. Journal of Association of Military Surgeons, 1903, Vol. xiii, p. 283.

Smith, Frederick. Modern Bullet Wounds and Modern Treatment, 1903.

Smith, J. W. British Medical Journal, 1901, Vol. i, p. 947.

Stephenson, W. F. Wounds in War. Stephenson, W. F. British Medical Journal, 1899, Vol. ii, p. 1099.

Stone, John H. Journal of Association of Military Surgeons, 1903, Vol. xii, p. 317.

Summers. Modern Treatment of Wounds.

Thomas, J. Lynn. British Medical Journal, April 20, 1901, p. 942.

Thomas, J. Lynn. Lancet, 1900, Vol. ii, p. 1296.

Thompson, C. M. British Medical Journal, 1898, Vol. i, p. 1251.

Thomson, Wm. Dublin Journal of Medical Science, August, 1901.

Treves, Frederick. British Medical Journal, 1900, Vol. i, pp. 599, 1156.

Treves, Frederick. Lancet, 1900, Vol. i, p. 1359.

Treves, Frederick. British Medical Journal, 1901, Vol. i, p. 1161.

United States Army. Report of Surgeon-General, 1899, 1900, 1901, 1902.

Van Hoff, J. Journal of Association of Military Surgeons, May, 1904, p. 308, and June, 1904, p. 379.

Vaughan, Geo. T. Principles and Practice of Surgery, 1903, pp. 15-19.

Wakley, Thomas. Lancet, 1904, Vol. i, p. 111.

Wallace, C. S. British Medical Journal, August 24, 1901, p. 474.

Williamson, L. P. Tri-State Medical Journal and Practitioner, 1898, p. 427.

Winter, Francis A. St. Louis Courier of Medicine, 1902, July, p. 1.

Woodruff, B. E. New York Medical Journal, Vol. 1xvii, p. 593.

Woolsey, T. New York Medical Journal, July 8, 1899, p. 37.

SOME EXPERIMENTS WITH A NEW METHOD OF CLOSING WOUNDS OF THE LARGER ARTERIES.¹

BY GEORGE EMERSON BREWER, M.D.,

OF NEW YORK,

Professor of Clinical Surgery in the College of Physicians and Surgeons.

THE object of this communication is to report and place on record some experiments undertaken with a view of obtaining some new and simple method of closing accidental wounds of the larger arteries.

The desirability of such a method was forcibly presented to the writer some years ago by an experience which occurred while performing a Bassini operation for the radical cure of inguinal hernia.

The patient was a young man about twenty-eight years of age, who presented himself for treatment of a left inguinal hernia complicated by an undescended testicle. Operation was advised, and the suggestion was readily accepted by the patient.

After removal of the sac of the hernia and the atrophied testicle, while introducing one of the deep sutures of chromicized catgut, a sudden gush of blood occurred from the deeper portion of the wound, which flooded the region and gave rise to a rapidly developing hæmatoma in the surrounding tissues.

It was evident that some deep vessel had been wounded, and an attempt was at once made to locate the injury. Digital pressure on the track of the suture temporarily arrested the bleeding, and the areolar tissue covering the iliac vessels was soon removed, exposing the external iliac artery for about one inch above Poupart's ligament. By transferring the pressure to the proximal portion of the exposed artery, it was seen that the sharp cutting point of the large Hagedorn needle had penetrated the wall of

¹ Read before the New York Surgical Society, October 26, 1904. 856

the vessel, making a clean-cut, longitudinal wound about onequarter of an inch in length. As soon as the proximal pressure was removed, a column of blood issued from the wound with such force that it rose fully two feet in the air, a fact which indicated an unusual degree of blood-pressure.

The grave risk of gangrene, amputation, and death, which would necessarily accompany ligation of the external iliac under these circumstances, clearly indicated the advisability of arterial suture and restoration of the blood supply to the limb. As the patient's condition was in every way satisfactory, this was deliberately undertaken with every hope of success.

The wound in the vessel was freely exposed, proximal pressure being maintained, and two or three sutures of fine silk were carefully introduced by means of a small, round, curved needle. These sutures included all the coats of the vessel but the intima, and when drawn together and knotted brought about a satisfactory approximation of the edges of the wound. The proximal pressure was then cautiously removed and the arterial current gradually re-established. At first it seemed that the closure had been successful, but as soon as the full force of the blood-pressure was restored, the stitches began to cut through, and in a few moments the entire wound was reopened by the force of the systolic impulse.

Proximal pressure was again applied and a second attempt made after removing the old sutures. This time the sutures included more of the vessel wall, and the line of approximation was further reinforced by uniting a mass of areolar tissue over it; but the result was the same, the arterial tension was so high that it would have torn out any suture that could have been used, unless the vessel could, at the same time, have been supported by being surrounded with some elastic material which would temporarily diminish its full expansion and the consequent traction on the sutures.

As the arterial wall was by this time so frayed by the tornout sutures that no further attempt at closure could be undertaken, nothing remained but ligation, which was accordingly performed, and the hernial wound closed in the usual manner.

By rare good fortune, no untoward results followed the ligation. There was scarcely any difference in the temperature of the two limbs, the patient experienced no discomfort, and was

discharged from the hospital, at the end of four weeks, completely cured.

It was during the performance of this operation that the idea of an elastic arterial plaster occurred to the writer.

It was evident that the failure of the sutures to hold was due to the high intra-arterial pressure and the force of the systolic impulse, both of which tended to the separation of the approximated edges.

It seemed at the time that if the vessel could be surrounded by some material which would limit the amount of expansion for even a few hours, and maintain approximation of the edges of the wound, adhesion would occur even without sutures. If so, such a method would also be applicable to many conditions in which suture would be impossible, as in an exceedingly thin or diseased arterial wall, calcification of the media, etc.

The material for such a plaster should be thin, elastic, and capable of maintaining its elasticity for several days after being embedded in the tissues. It must be exceedingly adhesive and capable of thorough sterilization. It seemed to me that, if the adhesive mixture used in the preparation of the well-known zinc oxide plaster could be spread upon thin strips of pure rubber, it might succeed.

After some correspondence with the firm of Johnson & Johnson, of New Brunswick, New Jersey, I had an interview with their chemist, Mr. F. B. Kilmer, who thought that such a material could be made, and that it could be thoroughly sterilized by formaldehyde vapor. After a number of experiments, he finally sent me a sample which seemed perfectly to fulfil the requirements.

Owing, however, to a change in my hospital work and other circumstances which seriously interfered with my plan of animal experimentation, the plaster was laid aside, and nothing was done with it for three or four years, when another similar experience again brought the matter to my attention, and emphasized the necessity of devising some new means of treating these cases.

The second experience occurred while assisting another surgeon perform an amputation of the breast for extensive malignant disease. After cutting off a number of the branches of the axillary artery, and while clearing away a mass of glands and infected areolar tissue surrounding the vessels high up under the coracoid process, he accidentally plunged the point of his scalpel into the axillary artery, inflicting a wound nearly half an inch in length.

In this instance I was able to successfully suture the wounded artery, and the circulation in the extremity was not impaired. Had the vessel wall been diseased, or had the tension been greater, the suture would have failed as in the other patient; and, as most of the anastomosing branches had already been sacrificed, the result of ligation would probably have been disastrous.

Shortly after this last experience, I decided to make a series of animal experiments with the plaster.

These experiments were carried out at the Surgical Laboratory of the College of Physicians and Surgeons, where I was assisted by Dr. J. W. Draper Maury and Mr. Gordon, one of the third-year students, to whom I am also indebted for the postoperative notes on the various animals and for the preparation of the gross specimens.

The following is the technique usually employed: The animal is etherized, the wound area shaved and scrubbed with green soap and hot water, then douched with ether, and a 1 to 1000 solution of bichloride. An incision is then made exposing one of the large arteries, the usual aseptic technique being followed.

As soon as the artery is exposed, it is brought to the surface of the wound and incised with the point of the scalpel. The vessel is then compressed above and below the wound, to prevent excessive hæmorrhage, and the sheath carefully removed. The artery is next cleansed of all blood by the use of a small pledget of gauze moistened with ether. As the ether evaporates, the vessel wall is left clean and dry.

A small strip of the plaster is next passed beneath the vessel, and the two corners held by two small artery clamps in

the hands of an assistant. (Fig. 1.) The strip is then put gently on the stretch and the lower extremity of the strip held by the clamps placed firmly in contact with the vessel, while the upper extremity of the plaster is slowly drawn upward. This causes the vessel to rotate with the plaster until the horizontal edge of the lower extremity of the plaster is on a level with the vessel and firmly adherent to it. (Fig. 2.) The two clamps are then passed over the vessel (Fig. 3) and the plaster kept on the stretch while the operator, with his thumb and forefinger, gently rotates the vessel backward, and at the same time compresses the enveloping plaster until it adheres snugly. The redundant plaster is then removed and the vessel allowed to fall back to its normal position in the wound. (Fig. 4.)

As soon as pressure on the vessel is relieved, the circulation is at once restored, as evidenced by the return of normal pulsations in the distal portion of the artery.

The vessel is then watched for a few moments to see if the plaster remains firmly adherent after pulsation has reappeared. The wound is closed without drainage and a gauze and collodion dressing applied.

The wounds, as a rule, heal kindly, suppuration having occurred in only two instances.

The following is a description of the various experiments and the results:

EXPERIMENT I.—A medium-sized dog was etherized, and the left femoral artery exposed in its lower third. The vessel was not at first recognized, as the writer was not familiar with the bluish color of the arteries in these animals. It was carelessly injured, and later double ligated and divided between the ligatures. Another incision exposed the artery one and one-half inches above. A longitudinal cut was made in the vessel about one-quarter of an inch in length, the plaster applied as described above, and both wounds tightly closed.

EXPERIMENT II.—The right femoral of the same dog was exposed, wounded and treated in the same manner, followed by complete closure of the wound and the application of a cotton and collodion dressing.

The dog recovered from the operation and seemed in his usual spirits the following day. He continued to do well for ten days, when the lower wound on the left thigh became red and inflamed. Two days later an abscess ruptured. On the morning of the thirteenth day the dog was found

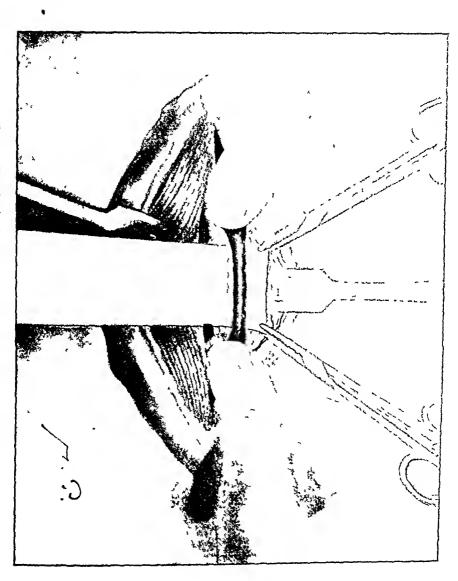


Fig. 1.—The elastic plaster is being drawn through beneath the artery.

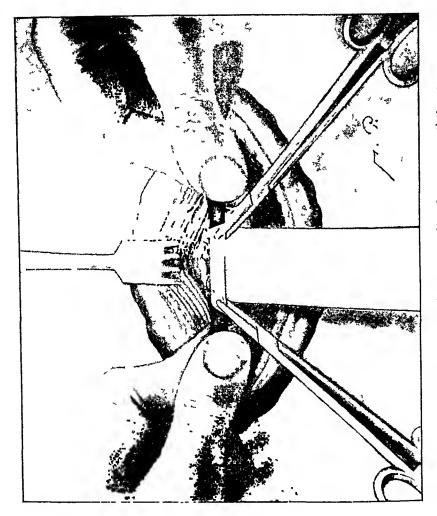


Fig. z —The extremity of the adhesive strip is brought in contact with the artery

FIG. 3.—The plaster is made to adhere to the artery.

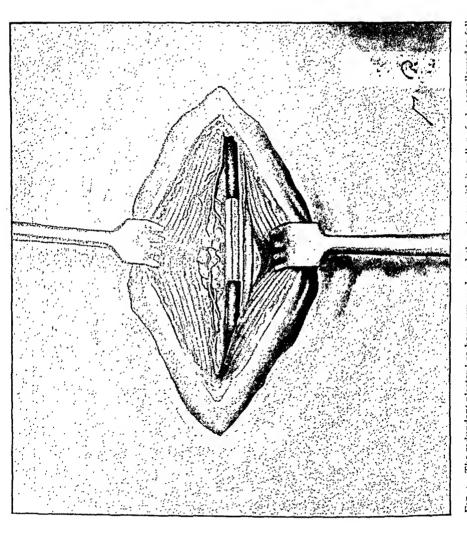


Fig. 4.—The redundant plaster has been removed, and the artery with its collar of plaster allowed to fall back into its normal bed.

dead in his cage, lying in a pool of blood, due to secondary hæmorrhage from the lower infected wound. Autopsy showed the upper wound in the left femoral completely closed and the plaster embedded in the surrounding tissues. The lower portion of the artery near the ligature had sloughed, and the dog had bled to death through the femoral artery, conclusively demonstrating that the vessel had remained patent at the seat of the longitudinal wound. (Microscopic sections of both specimens exhibited.)

Examination of the right femoral artery showed that the plaster had become slightly loosened at one point, and, although the wound in the vessel had healed, the lack of support had resulted in the formation of a saccular aneurism. The lumen was patent throughout.

EXPERIMENT III.—A small fox terrier was etherized. Right common carotid exposed by a three-inch incision, the vessel punctured, and the wound closed with the plaster in the usual manner; circulation re-established, and the cutaneous wound united with a continuous suture of fine silk.

EXPERIMENT IV.—Same animal. The left common carotid was exposed by a separate incision, punctured and closed in the same manner; circulation re-established in the vessel, as evidenced by return pulsations throughout its entire exposed portion. Wound closed and dressed.

The dog recovered from the anæsthesia and showed no sign of discomfort. Two oval swellings appeared over the wounds. There was, however, no tenderness, and the stitches were removed on the fifth day, the swellings having largely subsided. Primary union throughout. Later, the swelling returned over the left wound, and the seventeenth day the wound opened and a small amount of bloody serum was discharged. No pus or redness of the tissues. The wound healed promptly, and the dog continued in excellent health and spirits for over three months, when he was again etherized, both carotids exposed by incision, and on gross inspection no sign of a wound or of the plaster could be detected. Both vessels pulsated normally and equally throughout their entire exposed areas. The vessels were then divided well above the original wounds and the animal allowed to bleed to death. Both specimens were then removed and found to be patent. (Specimens exhibited.)

EXPERIMENT V.—Medium-sized mongrel dog was etherized, and an incision four inches in length made through the left rectus abdominis muscle below the umbilicus. On opening the peritoneal cavity, the intestines were drawn aside and held by sterilized gauze pads, exposing the abdominal aorta. A point was chosen just below the origin of the inferior mesenteric artery, the peritoneum incised, and the areolar tissue and sympathetic fibres removed from the vessel for a distance of one inch.

The artery was then drawn upward and held by the fingers of an assistant. An incision was made with the point of a scalpel through the anterior wall of the vessel, from one-quarter to one-half an inch in length, through which a stream of blood issued with considerable force whenever the proximal pressure was released. The artery was then thoroughly cleansed and dried with gauze pads moistened with ether, the plaster tape applied in the usual manner, and the peritoneum united over the vessel.

Considerable difficulty was experienced in applying the plaster, as it was impossible to raise the artery more than a short distance from the spinal column, owing to the presence of the numerous lumbar branches. The abdominal wound was closed by two layers of suture, and a cotton and collodion dressing applied, which was reinforced by a tight abdominal binder.

At the close of the operation distinct pulsations could be felt in both femorals; and the extremities, which during the operation had become quite cold, soon regained their normal warmth.

No untoward symptoms followed the operation. The dog was up and walked about his cage the following day, and from that time on appeared in good health and spirits.

He lived three months and two weeks, and was then killed for the specimen. On autopsy the vessel at the point of operation was surrounded by a rather dense layer of areolar tissue which completely embedded the plaster. The vessel was thoroughly patent. (Specimens exhibited.)

On all of the animals reported thus far, the first specimen of the plaster furnished by Johnson & Johnson was used. The plaster was exceedingly thin and very adhesive, although its elasticity had been somewhat impaired by the three years it had lain in my desk drawer. That fact was, in the writer's opinion, an advantage, for it could be snugly applied without producing too much pressure on the vessel.

A second specimen of the plaster furnished by Johnson & Johnson for experimental purposes was somewhat heavier and decidedly less adhesive. When applied with the same degree of tension, it caused much greater pressure on the vessel, frequently leading to a narrowing of its lumen, and occasionally to the formation of a clot, even when the vessel wall was not punctured.

Experiments VI and VII.—Same dog as in Experiment V. Both common carotids exposed through a single median incision, sharp longitudinal incision made in each, which was afterwards closed with the heavier plaster. In this instance it was necessary to moisten the adhesive surface of the plaster with ether in order to insure firm adhesion. It was also necessary to hold the plaster in place much longer than in the other experiments. When it was seen that adhesion was firm and that the artery pulsated normally, the wound was closed and dressed in the usual manner. No reaction followed the operation, the wound healed primarily.

Three and one-half months after the operation the dog was killed and the arteries examined. Each was surrounded by a layer of fibrous tissue which completely embedded the plaster. Both arteries were patent. (Specimens exhibited.)

EXPERIMENTS VIII AND IX.—Small dog, median incision. Both carotids explored, incised, and the wound closed with heavy plaster. No reaction. Dog appeared in excellent spirits on day following operation, and continued well until the thirty-fifth day, when he was killed and both arteries removed.

On examination, both arteries contained firm clots; but as they were immediately immersed in a strong solution of formalin after removal and before any examination was made, it is probable, in the absence of any cerebral symptoms, that the clots were of post-mortem origin. (Specimens exhibited.)

EXPERIMENTS X, XI, XII, AND XIII were upon dogs which were at the same time operated upon by another member of the Laboratory Staff, who performed on each a gastro-enterostomy by a new method. Both dogs died of peritonitis, one on the fourth and the other on the fourteenth day. Both carotids were opened and repaired by the heavy plaster.

On autopsy, only one of the carotid wounds was infected. All four arteries, however, were filled with firm clots.

EXPERIMENT XIV was upon a dog also employed for a gastro-enterostomy on the same day. Only one carotid was opened and closed with the plaster. He made a good recovery, but had a very considerable hæmatoma at the site of operation.

As six of the eight experiments with the heavy plaster had upon autopsy shown the vessel to be occluded by a clot, and as none of the animals upon whom the first specimen of plaster was used had presented occluded vessels, it was thought that the trouble was due to the greater degree of pressure exerted on the vessel wall by the heavy plaster, or perhaps to the greater amount of digital compression used to insure firm adhesion.

To verify this, Experiment XV was performed, which consisted simply in exposing the remaining common carotid in the animal used in Experiment XIV, and applying the heavy plaster without wounding the vessel.

On autopsy, both arteries were found to be filled with firm clots, which leaves very little doubt but that the pressure, and not the method, is responsible for the thrombosis.

In the writer's opinion, these experiments demonstrate that, in dogs at least, small wounds of the larger arteries can be successfully treated by the application of an aseptic elastic plaster. That this plaster should be exceedingly thin, very adhesive, and applied with the minimum of pressure on the vessel wall; and that, if the operation is carried out with perfect aseptic technique, the plaster becomes embedded in the tissues and produces no untoward symptoms.

The writer has had no opportunity of trying this method on the human subject, but would not hesitate to do so if an occasion presented.



Fig. 1.—Family E, photographed July, 1904. T. E., aged $4\frac{1}{2}$ years, operation at $2\frac{1}{2}$ months

M. E., aged 2 years; operation at 2 months
Baby E, aged 5 months; operation at 1 month.



Fig. 2.—Baby E, before operation.

The cranial depressions in the three infants were similar in site and dimensions.

BIRTH-FRACTURE OF THE SKULL.

FAMILY OF THREE, ILLUSTRATING THE EFFECTS OF OPERATIVE TREATMENT.

BY JAMES H. NICOLL, M.D.,

OF GLASGOW,

Professor of Surgery in Anderson's College.

Fig. 1 is a photograph of a family, taken recently, to which are appended the respective ages, and the dates of operation. All presented a depressed (greenstick) fracture of the skull in the left frontal region, the result, apparently, of injury by compression against the maternal pelvis during delivery. Fig. 2 is a photograph of the youngest member of the family, and a photograph of the second child (forming one of a series of such cases) will be found in the *British Medical Journal* for December 19, 1903. The site, size, and shape of the depression were practically identical in the three.

None of the three had been treated at birth by Munro Kerr's manual moulding method. None showed evidence of spontaneous improvement, though the eldest was kept under observation for two months before operation.

Operations and Results.—In the case of the eldest, operated on some four years ago, the depression was elevated by metal elevator and bone hook. It proved, however, so resiliant that, while it was comparatively easy to elevate it, it was impossible to prevent the bone springing back into its former depressed site. An attempt to obviate this tendency by over-correction of the deformity resulted in the area of bone breaking up into several segments, and, as each of these still remained depressed against the dura, they were excised. The result in this case is a gap in the bony skull, which, though lessening in area by growth of the surrounding bone, still exhibits cerebral pulsation in an area of about three-quarters of a square inch.

In the case of the two younger children the method of operation followed was inversion of the depressed areas of bone, measuring respectively two and two and a quarter inches in diameter. The result, in both cases, was the usual rapid union of the young growing bone (union firm at the end of one week, when the scalp sutures were removed), with complete correction of the deformity.

Remarks.—Depressed (greenstick) fracture of the skull is comparatively common in infants and young children. I have treated by operation twenty-three such cases. Of these five were traumatic, from falls or blows after birth, and eighteen the result of difficult labor. The ages at operation of these cases ranged from three weeks to eight years.

In symptomatology the cases have varied. In a number, apart from the deformity, there have been no symptoms. two there were "convulsions," doubtfully due to the depression, and persisting in one after successful operation for the deformity. In two others epileptiform convulsions were, also doubtfully as the convulsions were general, attributed to the depression. Both of these cases were, apparently, cured of the epileptic affection, but at a period so long after remedy of the deformity that it is reasonable to view the recovery as quite as probably due to the lapse of time and the medical treatment carried out as to the operation. In one, a child of three, there was acute tenderness over the depression, which disappeared after operation. In another, a child of five years, there is mental deficiency. This is said by the parents to have shown marked improvement since the operation, some two years ago, so much so that recently at the urgent request of the parents a similar area on the opposite side of the skull was dealt with (on this occasion by craniectomy), with what result is not yet apparent. One case presented a fluid swelling, occupying part of the depression, and becoming tense when the child cried or struggled. At the operation this was found to be a collection of cerebrospinal fluid under the pericranium communicating with the subdural space through a linear gap in the bone and dura over the dome of the depression. and three others, presented laceration of the dura, patent or healed. In the majority of the cases the dome of the depression when excised (i.e., the internal table) has presented either

actual greenstick splintering or evidence of that having taken place.

The Method of Operating.—In the earlier cases this was by elevation, and in these cases various methods were practised. In some the scalp was raised as a flap, or by linear incision; in others simply punctured to admit an elevator or other instrument. In some the elevator was introduced under the depression from a small aperture made in the bone near the periphery of the depression or through a neighboring suture, in others the bone hook or other instrument was introduced through an aperture made in the centre of the depression. some the depressed area was dealt with as a whole, in others after being cut, crucially, into quadrants. Of such methods practised in very recent cases, very young infants with pliant bones, and before the deformity has become "set," I have had no experience. In the cases with which I have dealt (ranging from two months to eight years after the injury) the results of such methods have been disappointing, so much so that I gave them up, and in two cases (vide Glasgow Medical Journal, February, 1901) excised the major portion of the depressed bone.

In the last ten cases operated on the method employed has been inversion of the depressed area. For the purpose I employ circular, parallel-sided trephines, ranging from one and a half to two and a half inches in diameter. These trephines are armed with rim-flange stops or guards adjustable by screw, which permit of rapid cutting without risk of injury to the dura. In one of the cases I made use of a Stelwagon trephine, cutting out a disk of three and a quarter inches diameter. For future trial in such cases, Messrs. Down Brothers have fitted for me a Stelwagon trephine to a steel brace. It is in no way detrimental to the reputation of an instrument intended for cutting semicircles to say that for cutting circles Stelwagon's trephine is inferior in speed and safety to a circular trephine with flange guard. It is, however, a simple and cheap instrument, which, with care and time, may be made

to cut a circle in the child's skull of any size up to, at least, four inches diameter.

The steps in the operation are, briefly, (I) Expose the depressed area by reflecting scalp and pericranium together, by flap or linear incision; (2) cut out the depressed area by the trephine; (3) invert it on a sterile swab or towel, and by thumb pressure reduce the bend as far as may seem to correspond with the natural curve of the skull; (4) replace it, still inverted, on the dura, and (5) secure the scalp over it by means of silkworm sutures, leaving sufficient space here and there between the sutures for natural drainage.

The rate of union of the inverted disk is rapid. In all ten cases bony union, so far as palpation demonstrated, was firm at the end of a week, when the original dressing was removed to withdraw the scalp sutures.

The operation is trivial. Of the ten cases, seven were treated throughout as out-patients after operation, two of the seven being the youngest members of the family E. (Fig. 1.)

Conclusions.—A survey of the literature available, and the experience of a number of cases seen, and particularly of the twenty-three cases operated on, appear to me to warrant the following conclusions:

- (I) That the statement made by a number of authors to the effect that, in the majority of cases, depressed greenstick fracture of the skull in infants rectifies itself if left alone, lacks substantiation. It is certainly no more true of the traumatic (as opposed to the parturition) greenstick fracture of the skull than it would be if made of any other greenstick fracture in the body. In regard to the parturition cases it may be true of some, viz., the slighter, cases of indentation, which may spontaneously disappear within a day or two of birth. In the more marked cases I cannot but regard such a statement as misleading. In cases over one month old, after the deformity has become "set," its spontaneous obliteration must be regarded as problematical, and as being, at best, both slow and partial.
 - (2) That in cases of greenstick depressed fracture of the

skull in infants and children which have not, when recent and soft, been remedied by Munro Kerr's method, operation is justifiable even if only for the correction of deformity. The excision of a nævus of the face or a small keloid scar from the neck is an everyday surgical procedure. The deformity of a cranial depression is quite as unsightly as either, and is the cause of much more anxiety to the parents, who attribute any little real or imaginary eccentricity of the child to his "queer head," while the operation for its correction is no more serious than is the removal of the nævus or the keloid. The twenty-three cases on which I have operated recovered without a death, many of them as hospital out-patients.

(3) That of the two methods available, elevation and inversion, the latter is decidedly the better, alike in the freedom from risk and the perfection of the result obtained.

DIVULSION IN ŒSOPHAGEAL STRICTURES BY MEANS OF A NEW INSTRUMENT.

BY ROBERTO ALESSANDRI, M.D.,

OF ROME, ITALY,

Professor of Pathological Surgery in the University of Rome; Chief Surgeon of the Third Division in the Policlinico Umberto 1.

In the February number of the Annals of Surgery, 1904, there appeared an article by Dr. Rilus Eastman, upon the treatment by direct dilatation of cicatricial esophageal stricfiire

In substance, bearing in mind the extreme variability of the anatomical conditions resulting from wounds or burns or other processes that finally bring about a stenosis of the œsophagus, variability either in the displacement of the lumen, or in the extension of the strictured part, or in the irregularity of the stenosed passage, he recognizes how badly the ordinary olive-pointed dilator answers in certain cases, since the position in the gullet of the olive-pointed dilator of a hard-rubber olivary bulb (page 166) attached to a springy whalebone shank cannot be controlled by the operator. (Treatment by direct dilatation of cicatricial asophageal stricture, Annals of Sur-GERY, February, 1904.)

The same objections may be made to the spiral metallic sound of Cracour and to dilators of woven tissue or of caoutchouc. Especially if the stricture has a valvular form and disposition-and examples of this are not wanting-is it extremely difficult to pass the stricture and to proceed with the gradual dilatation by the ordinary method.

He therefore proposes to use, and has used with success, elastic, malleable sounds formed with thin, smooth, metallic spirals or of web-silk containing withdrawable lead core.

By curving the extremities in various ways, we can with these sounds experimentally pass a stricture, just as is often done in strictures of the urethra, by means of filiforms whose points can be variously bent or twisted into spiral or corkscrew form.

And the comparison is the more exact as the author proposes in certain cases to screw the extremities of an ordinary metallic esophageal sound to the head of his special filiform sound, and so push it into the stomach, passing the stricture precisely as we do with the filiforms and with the divulsors or urethrotomes in urethral strictures.

And the author has also constructed a dirigible metallic sound whose point can be turned at will by means of a screw which is in the handle, almost as we turn the lever in the cystoscope with the urethral catheter, and can then be guided after various attempts to pass an œsophageal stenosis.

It is, however, easy to understand that this instrument must be of much less practical utility than the first described filiform sound.

When this article appeared, I had under my care at the Hospital of San Giacomo a patient, whose history I shall relate later on, suffering from severe and extended esophageal stenoses impassable by the ordinary sounds or the olive-pointed dilators, which fact had already made me design and employ a new instrument.

I agree with Dr. Eastman that the only way to overcome the stenosis in these cases is by means of very fine ductile sounds, whose extremities can be directed in various ways, and when used by a practised and careful hand, trying, I would almost say, testing, the œsophageal walls in their different segments, they may succeed in threading the restricted and often decentralized passage, or in overcoming the valvular formations that arrest the ordinary sounds.

As a rule, we do not act otherwise in the case of stenosis of the urethra, and the resemblance is obvious, making allowance for the greater difficulty of manipulation in the esophagus.

And this purpose, I agree with the author, may very well be answered by the filiforms he proposes, whether metallic or elastic, with lead core or not.

But also ordinary whalebone filiforms with varying points

will answer very well, especially with a very small metallic terminal olive screwed to the end of a little metallic ring, precisely as is done in manipulations with the urethra, when often, after repeated attempts and sometimes after several sittings, of course always careful and cautious, we at last succeed in overcoming a stenosis that resists other ordinary olive-fitted sounds.

But yet to succeed in passing with a thin whalebone string, or with a filiform sound, as proposed by Dr. Eastman, is often less than nothing, since the success is not easily repeated, nor can it be followed up with a thicker sound, and the treatment is not advanced a step.

But the filiform introduced may serve as a guide precisely as happens in the case of the urethra, and as in the latter, so in the case of the œsophagus, one could slip in either hollow elastic sounds open at the end like those of Patamia for the bladder, or, as Dr. Eastman suggests, screw a spiral metallic sound on to the end of the filiform, and, driving this into the stomach, pass the stricture with a thicker sound, or finally use filiforms to conduct one of the recognized cutting instruments across the strictured point.

The first two means are often difficult to employ, and when forced may become dangerous. We know this in the case of the urethra, where the manipulation is more external, more easy, and is controlled both by the eye and the fingers.

The so-called internal œsophagotomy is an operation which, since 1861, when Maisonneuve boldly practised it for the first time with his instrument, although not very frequently used, is found described and accepted in all treatises of operative surgery. Maisonneuve's instrument is of construction similar to his urethrotome (only naturally it is longer and somewhat thicker), is provided with a conductor, and cuts from above downward, with a blade of triangular anterior point and two sharp sides. It gives no certainty of the depth of incision, and, further, in a case of partial stenosis, may cut also on the other side, producing unnecessary lesions. For the same reason we must reject the "anterograde" œsophagotome of Lannelongue, which also cuts downward; the author used it with good success in one case.

That of Dolbeau, on the other hand, cuts upward, and is constructed with a terminal sphere ending in a conical point, the sphere being six millimetres at the base, and the two blades cutting laterally; the blades are made to open by means of a mechanism in the handle; as soon as the olive which covers them has passed the stricture and in drawing up they are arrested on the strictured point; the opening of the blade is in proportion to the diameter of the sphere, therefore all danger of cutting too deep is excluded.

More in use (Trélat, Tillaux) is the Trélat œsophagotome; and even nowadays it is recommended in preference to others (see Monod and Wanwärts). It is made with a curved rod having an inverted olive at the end, that has to pass across the strictured point, surmounted by an enlarged part that touches and stops on the stricture itself. In the terminal portion there are two sheathed blades as in the hysterotome of Weber, which, by means of a screw in the handle of the instrument, can be made to open, while the extent of the opening can be graduated according to a little index near the screw from one to twenty millimetres in length.

In using this instrument, it is recommended, first, to determine the distance of the strictured point from the incision by means of an ordinary olive-fitted sound, and, having marked this point on the rod of the instrument, introduce it as far as the point marked, pass the stricture, turn the screw, opening the blades more or less according to the circumstances, draw the instrument up some centimetres, close the blades by turning the screw in the opposite direction, and withdraw the whole instrument.

In this way it is said the stricture is cut from below upward with precision to the depth required, and in the exact point predetermined.

But it is first of all necessary that the terminal olive part can pass the stricture, and when this is possible, we could do without the œsophagotome; and it is also necessary that the stricture be only one and small; and even in these cases all inconvenience is not excluded, since, when used by Trélat himself with an opening of the blades of twenty millimetres, a serious hæmorrhage occurred ($Gaz.\ des\ Hôp.$, 1870, p. 115). Studsgaard used an instrument fifty centimetres long, which carried an elastic conducting sound with a button at the end and a cutter within a pair of steel tongs, out of which it could glide, this cutter measuring one centimetre in diameter at its greatest breadth.

Czerny used an œsophagotome constituted on the model of Ivanduch's urethrotome, only longer. The instrument was introduced closed, and the stricture was cut from below upward, the cutting blade extending about two millimetres from the sheath.

Sands also proposed a new esophagotome constructed after the type of the urethrotome. To obtain both the incision and the dilatation from the strictured point, the blades are hidden in split olives. The stem of the instrument is formed of a hollow spiral, through which run two thin metal threads connected with the blades; these by a movement of a screw leave the olive, while an indicator gives the depth of the incision. A movable ring on the rod serves to mark the distance of the stricture from the incisors.

Le Dentu, who thought the instrument of Trélat useful, when it could be used, in a case of his, in which the contraction was too narrow to admit Trélat's conductor, reverted to the double-bladed œsophagotome of Maisonneuve, the comparatively thin conductor of which can pass into an œsophagus where No. 11 or 12 urethral sounds could pass.

Yet he says textually, "avec ses lames formidables c'est un instrument dangereuse qui a fait ses preuves dans se sens." He modified it, therefore, preparing six blades, graduated in three pairs, five, seven, and nine millimetres in width, so that combining them differently he could obtain incisions of from twelve to twenty-one millimetres.

He used it in a case in which the stricture had extended far, and could only be passed by a urethral sound, No. 11; Trélat's instrument he could not use. With his own instru-

ment he was able first to make an incision with two blades, No. 1, and then with one blade, No. 1, and one No. 4.

Then the invalid, who was wilful, insisted on leaving the hospital, and we know no more about him. The success, therefore, remains incomplete.

Schlitz has an instrument that was used by him in three cases with success, and in two others by Kölliker (see Weber). It is a hard gutta-percha tube with one of the usual hollow sounds, sixty-eight centimetres long and twenty millimetres in circumference, with its lower extremity blunt, girt three centimetres above this point with a metallic sheath, split lengthwise, from whose cleft the knife issues when required. The knife is moved by the hand working a metal thread that passes inside the sound, and at will the knife is made to escape from its sheath and return into it. It is governed by means of a screw that lengthens and shortens the metal thread, and so causes the knife fixed at the end to issue more or less from its groove. Besides this, the external extremity of the sound has an eye that stands in the longitudinal axis of the instrument, and is always on the side opposite the blade at the other extremity of the sound; so the operator may know in what direction the incision is being made. The greatest distance that can be obtained between the point of the blade and the axis of the instrument, by means of the screw, is seventeen millimetres. This œsophagotome is used in the "retrograde" way (cutting on withdrawal). When, therefore, the sheath with the cutter is passed across the stricture, the screw is turned for the exit of the blade to the extent desired, and the instrument cuts as it is drawn up. For further particulars, Weber's article should be consulted. But it is not of great importance.

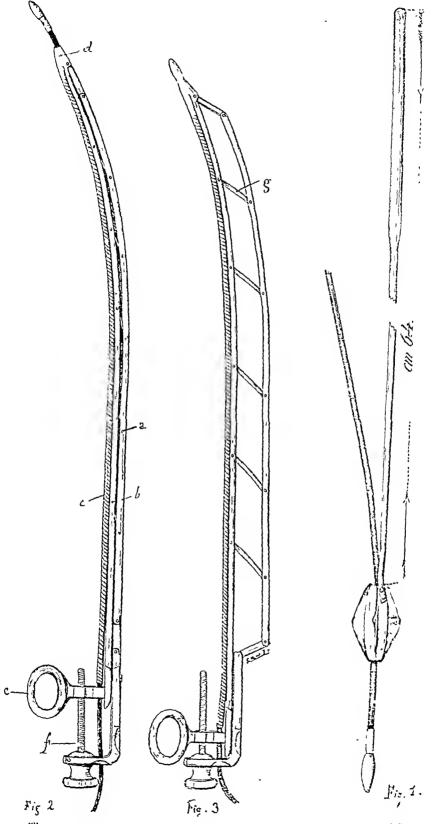
The important thing is that these are all dangerous instruments, especially, and all agree in this, those that cut downward, even when guided as Maisonneuve's and Lannelongue's, and also that modified by Le Dentu, and therefore almost everybody rejects them. Monod and Wanwärts include Reybaud's instruments among the dangerous ones.

The so-called "retrograde" instruments have the initial

and formidable defect that the restriction must be penetrable by instruments of a certain diameter. Trélat's has four millimetres diameter in its narrowest terminal portion, Schlitz's has six and a half. And then they are dangerous. In a case of Trélat's own, and in one of Schlitz's, there was hæmorrhage after the operation, and in a case of Czerny's there was death. Besides, as I have said, if in a case of stricture you can pass an olive-fitted sound of four or six millimetres, we may say such a case is absolutely exceptional, if one could not succeed as well by gradual dilatation, which is naturally far preferable to all other methods in the treatment of œsophageal stenosis.

There are some cases, as I hinted at in the beginning, that only allow the passage of filiforms, and these not easily and not always; so that it is not possible to pass every day and effect a regular progressive dilatation; and for this it is often necessary to try over and over again, and to use fine whalebone sounds, bending them in various ways, and resorting to artifices; and in these cases, when we have once passed, there immediately arises the necessity and the desire that this laboriously obtained result shall not become useless through the withdrawing of the sounds, which who knows when we shall succeed in reintroducing; and it is rather desirable to use them as a guide to obtain a rapid dilatation that may permit of the entrance of thicker sounds so as to continue then the daily dilatation with less difficulty with the ordinary sounds.

Durante, several years ago, for a case of this kind, designed a special olived œsophagotome, cutting from above downward and guided by whalebone strings. The instrument consists of a thin whalebone guide (Fig. 1), the extremity of which is provided with a little metallic olive, not more than one or two millimetres in diameter, and whose length must be great enough to allow of a second string being screwed on to the first with a little metallic ring. When the guide has been introduced across the stricture, the essential part of the instrument slips on to it, consisting of a conical metallic olive, whose greatest diameter is from six to eight millimetres, furnished with three embedded cutters like those of Maisonneuve's instru-



The ecsophageal divulser of Alessandri.

The œ-ophagotome of Durante.

ment, but smaller, and only from three to four millimetres when at their extreme height. The olive is fixed on a thin flexible metallic stem, and is pierced down the middle so as to be threaded on the guide and pressed down upon it by means of the flexible metallic handle as far as the strictured point that it is forced to pass, partly tearing and partly cutting it.

In two cases Durante applied it with success. In a case that came under my care last winter, in my department of the Hospital of San Giacomo, I wondered if I could not with greater safety have recourse to an esophageal divulsor, in the same manner as is daily done for the urethra. Here also we must recognize the difference of opinions in favor of the urethrotome or of divulsion.

It is certain that divulsion gives excellent results, provided one does not try to get too large a dilatation at first, which may cause laceration and infiltrations, and which, above all, is not necessary, because a moderate divulsion is enough to allow of the subsequent easy passage of sounds, gradually increasing in thickness and the safe reaching of the degree of dilatation desired.

I do not see why we should not try to obtain the same results in the case of the œsophagus. Yet divulsions in the case of œsophageal stricture is never mentioned in treatises of surgery or in special memoirs, or if spoken of is rejected.

Albert says it is an operation so dangerous that it has justly found no advocate. He says we may have laceration of the esophagus or necrosis even of small points with consequent ichorous infiltration. And he mentions the figures of the dilators of Le Fort and Demarquay, which have the very great fundamental defect of the retrograde esophagotomes abovementioned, that is, they are not guided, and have such a diameter that they cannot pass across a severe, extended, or irregular stenosis without danger, and for such stenosis, where they can pass, the same Albert's observation is justified that equally good results can be obtained by gradual pressure of a conical sound.

König mentions and gives figures of Fletcher's dilator, which has three arms, varying according as a button that is

placed between them is pulled; and also he mentions a parallel dilating sound of Schützenbergh and a pincette with branches, that open parallel to each other, of Broca.

v. Hacker mentions the instruments of Collin, Vidal, and Leube. He also describes those of Jameson, Bruns, and Svitzer, which, however, are only artifices for a graduated dilatation, and cannot be called divulsors. They are modifications of the ordinary olive and crescent dilator of Tillaux.

That of Jameson (see figure in König) is formed of a whalebone rod, bearing an ivory olive at its extremity. The olive is pierced lengthwise to allow the passage of a little metallic rod with a button, this rod serving as guide. Rather than a divulsor, it is a guided olive dilator.

That of Bruns (figure in König) is the same in conception. Upon a guide three millimetres in thickness, on to which a little ivory sphere of five millimetres can be screwed, guides are driven by means of a threaded sound, or wedges of ivory of various sizes with a special propeller and two threads are fixed to them to withdraw them after having left them for a long time. Instead of the guides, we can use silk thread, to which a little sphere is attached, that the patient swallows, and which passes the strictured point.

Svitzer in the same way passed the strictures with ivory olives fixed to a thread, introduced by means of a whalebone sound that was fastened in the hollow of an olive, and then with a twist movement freed itself, and was withdrawn, and the patient then by drawing a thread could extract the olive.

In the same way, but with the object of maintaining it there for a greater or less length of time, and so assure nutrition, small cannulas are introduced fixed to threads, so completing a kind of intubation.

As is seen, all these are means that differ little from the ordinary graduated dilatation by means of sounds or olives, or are modifications of it, and they are more or less successful artifices.

Senator with a sound introduces a little cylinder of laminaria attached to a thread and leaves it for more or less time,

at the most an hour; but the strength of the dilatation cannot be controlled.

Schreiber fixes a little tube of caoutchouc, hermetically sealed with sealing-wax, on a whalebone filiform, projecting from an œsophageal sound, to which it is also fixed. When it is in the strictured part, tepid water is introduced, and the tube is distended and the strictured passage can be widened. Reichman and Russell use similar instruments, however, with air pumped in instead of with water.

As von Hacker observes, the minimum of diameter of the instruments is, however, three millimetres; and so they do not serve for very severe strictures.

As a sample of general opinion we can refer to that of Albert, who, after having equally rejected divulsion and internal æsophagotomy, says that the safest process is with external æsophagotomy and gastrostomy.

But the laceration and neurosis he fears in divulsion may arise only if one pushes down the instrument blindly, and if in the divulsion we exaggerate and try to obtain at once an advanced dilatation.

Of course, these dangers are not smaller with any kind of œsophagotomes. Several of them dilate beside cutting, and the incisions may often give rise to serious hæmorrhages (as in the case of Trélat and Schlitz); nor do we often know in what direction the incision or incisions will occur, and even in those instruments, such as those of Schlitz, in which this is indicated, we gain very little when we consider we do not know in what part the cicatrization of the œsophageal wall is thickest.

External œsophagotomy answers well in certain special cases, always in the cervical region, for no one thinks of practising intrathoracic œsophagotomy for simple stenosis.

As to gastrostomy, there is universal agreement that it is necessary in certain cases where the stricture is not passable, and it is imperative to nourish the patient, that his general conditions of health may be sustained.

It will be then in these cases an excellent preparatory

operation, since it only serves to permit tranquil manipulation and to increase the hope of success in passing the lateral stricture, and then closing the gastric fistula.

Or it may serve for retrograde catheterism, and certainly this is a method that has often given excellent results, when in no other way an esophageal stenosis, especially a low placed one, could be passed. I do not wish here to enter upon the subject of retrograde catheterism, which would take us too far from our subject, and which, any way, is certainly a process to be reserved for certain special cases.

In the case I have referred to, and of which I will now give in brief the clinical history, I did not find myself urged to gastrostomy, or to attempting retrograde catheterism, since, although, for many days, the stricture was not passable by even the finest sounds, and, above all, did not lend itself to a gradual regular dilatation, for although, one day, I did succeed in the insertion of a string, I did not succeed either in proceeding further in the same sitting, nor in the following days did I often succeed in re-introducing the same sound, yet, all the same, liquid passed, and nutrition went on sufficiently satisfactorily.

And therefore, while I deferred, if necessary, recourse to gastrostomy or to a trial of retrograde catheterism, I thought this was just the occasion to force the constricted part so as to permit the passage of gradually enlarged sounds.

I confess that I had no disposition to use any of the recognized œsophagotomes, nor yet that of Durante. The length and the irregularity of the constricted part, evident from the great difficulty in the introduction of a simple whalebone string, led me to believe that the cuttings would be uneven. and the œsophageal wall would be variously interested.

And all the dangers mentioned above of the various esophagotomes of anterograde type—since there was no question of the retrograde—made me abstain from using them.

I devised and had constructed by Invernizzi, of Rome, an instrument of the type of the urethral divulsor of Oberlaender. of which there are two forms, an original and a new one, or

of the divulsor urethrotome of Otis. I give here the drawing and a summary description.

As is seen from the figure (Fig. 2), the instrument when closed consists of two flexible metallic bars (a and b) firmly joined together, and of a metallic spiral (c) which represents a pierced sound, all united at the extremity in a truncated conical point, also perforated (d). In the handle there is an eyelet (e) for the guidance of the instrument, and a screw (f) serving to separate the two bars, raising the inner one by straightening out the cross bars (g), which vary the distance of the bars according as desired.

Having passed the stricture with a whalebone filiform, such as may pass through the pierced extremity of the instrument, and preferably ending in a little metallic olive as in the guides of Durante's œsophagotome, over this (Fig. 2) the closed instrument is introduced, and arriving at the stricture is pressed gently but surely across it, since in this way it only acts as a guided conical sound. When the strictured point has been passed, the screw in the handle is turned and the bars are separated (Fig. 3), more or less, according as it is desired; it being observed that great force is not necessary, and that we may content ourselves with a slight divulsion, not dangerous, so that immediately, or in the following days, we may pass it with sounds of increased caliber. But this limitation is almost inherent in the instrument itself, since by its very curve and the direction in which the transverse bars rise, if the dilatation is exaggerated or if the resistance at the stenosed point is great, the separation of the bars will not take place, and the screw movement is counterbalanced by the increase of the curve of the whole instrument.

We may convince ourselves of this by forcibly pressing the extremity of the instrument while we turn the screw in the handle.

In the case in which I used this divulsor the manipulation was performed easily without any kind of inconvenience, either immediately or later on; and only on the day after the operation the passage of food, even liquid, was more difficult, and

the patient complained of a slight pain in the epigastrium; but after the second day swallowing was easy and the passage of the sounds possible, while, as I have said, it was before very difficult, and, above all, I found it easy gradually to increase the caliber of the sounds until we reached a sufficiently large dilatation, which was maintained, the sounds passing from time to time until the death of the patient two months after the operation, happening almost unexpectedly and from pulmonary lesion.

Another important feature to be emphasized in narrating this case of mine was the nature of the stricture. The sufferer, forty-two years of age, had been a hard drinker (especially of spirits), smoker, and an inveterate tobacco chewer.

There was never an ingestion of acids or hot liquids; there was no syphilis; there was, on the other hand, pulmonary tuberculosis, and the year before he had suffered an operation of gastro-enterostomy for pyloric stenosis.

Given the pulmonary tuberculosis, a specific stenosis might have been imagined. But the hardness of the stricture, the complete absence of any bleeding under repeated manipulation and attempts at soundings, the fact that the obstacle to the passage of liquids did not increase, and that the attempts could be continued for weeks, also excluding the idea of neoplasm, seemed to me convincing reasons to the contrary.

I may mention that Debove communicated to the Society of the Hospitals of Paris (August 12, 1887) (De l'ulcère simple de l'œsophage et de rétrecissement consecutif de cet organe. Gaz. litt. de med. et chir., 2 Sept., 1887), two cases in which he admitted stricture of the œsophagus following on simple ulcers altogether resembling those of the pylorus.

Basing his opinion on incomplete anatomical observations of Quincke, he attributed these strictures to simple ulcers. The first was dilated and cured; the second patient, on the other hand, died, and Debove says that the autopsy confirmed the opinion that there had been ulcer of the œsophagus analogous to gastric ulcers.

It is to be noted that Debove's patient had formerly had

hæmatemesis, and died from the perforation of a typically trophical gastric ulcer. On the œsophagus, five centimetres from the cardiac, he found a circular scar one-half centimetre deep, with some fibrous irradiations towards the upper and lower portions of the mucosa. The forefinger could pass over it easily. (The patient was catheterized daily for the last three years.) Above the strictured point the œsophagus was cleanly dilatated.

In the case under my observation, the absence of determining causes of stricture or ulcers of the œsophagus, the decisions I came to, as above set forth, as to the neoplastic or specific nature of the affection, the low position of the stenosis, the contemporaneous existence of pyloric stenosis, all made me think that here I had to do with a similar example to that of Debove.

CASE.—G. V., of Camerino, clerk, forty-two years old, entered the Hospital of San Giacomo, February 21, 1904, and was placed in my section at No. 22 (Ward Genza). (Descriptive No. 515.)

Nothing important as to heredity. He had been an obstinate drinker, smoker, and tobacco-chewer. He asserted he had only once had blennorrhagia. In the spring of 1903 he had violent pains in the gastric region, with fever, from which he got better under a treatment of dieting and medicaments. But in June the former troubles came on again, and just after swallowing food he used to be taken with violent efforts to vomit, which ended in ejection of the food, unless in liquid form; he had, besides, pain along the esophagus during deglutition, also in the stomach immediately after his meals.

These symptoms grew more severe, the pain went on increasing, and became almost permanent.

With a diet rigorously liquid, alkalies and bismuth, he seemed to get better; but at any attempt to introduce any food not liquid the same troubles recommenced, in especial the efforts to vomit, the pain in the gastric region and pain also at a point in the back. He stated further that he had before this time and before taking any medicine (bismuth, for example) pitch-black excrement; on the other hand there had never been hæmatemesis.

He therefore entered the Hospital of San Giacomo in August, 1903, and was declared to be suffering from dilatation of the stomach. It was at a distance of two fingers' breadth above the navel, and there was pain upon pressure of the epigastric angle.

He was operated on September 1. He was found to have the stomach enlarged, pyloric stenosis, no neoplasma. He was operated by Doyen's gastro-enterostomia process.

He left the hospital cured October 11, 1903. He remained fairly well until December, always, however, observing a careful diet, when suddenly, and without dietetic disorder, he began again to have vomitings of his food, and not to be able to swallow more than a mouthful of liquid at a time through an impediment above the stomach that the patient localized in the epigastrium. He said if he swallowed four or five mouthfuls of liquid together he felt full up to the throat, almost suffocated, and, finally, was obliged to disgorge all. If, on the other hand, he drank small draughts at intervals, he felt the liquid gradually descend into the stomach, and then he had no further difficulty digesting perfectly. His motion was irregular and constipated.

When I tried to introduce an ordinary gastric sound it entered easily for some distance, and at a given point stopped at an insurmountable obstacle, about forty centimetres from the dental arch. With conical cylindrical olive-pointed œsophageal sounds I did not succeed in passing, nor yet with the smaller ones; only once I managed the passage with a sound of five millimetres caliber, and that only after repeated efforts; but in the same sitting, after the first had been removed, I could not proceed with sounds of increased caliber, nor in the following days was I able to reintroduce the same sound.

The passage of liquids was, however, possible, and the patient could nourish himself, swallowing by mouthfuls milk and broth. So I suspended the gastrostomy I had intended, and also any attempt at retrograde catheterism, and I constructed my instrument.

When I had it, for several days I could not use it, since I could not succeed in passing the stricture even with a whalebone olive-pointed filiform of two millimetres.

At last on April 4 I succeeded in introducing the filiform, and over this I soon brought the instrument, which with graduated efforts I succeeded in bringing past the strictured point;

afterwards I turned the screw to widen the arms and then withdrew all.

In the following days I easily introduced sounds of five millimetres and six millimetres, and in the sequel we succeeded in easily passing sounds of one centimetre and more, while the patient could swallow porridge (minestra) and minced meat. At the end of May the lung trouble from which the patient had suffered, grew worse. He died of this on June 4. At this time the esophageal stricture had been sufficiently dilated, and the passage of the sounds was only made every three or four days.

We could not make the autopsy, through objections on the part of the family.

BIBLIOGRAPHY.

Albert. Treatise of Surgery, Vol. i.

Bryk. Narbige Striktur des Oesophagus; Oesophagotomie, Wien. med. Woch., 1877, t. xxvii.

Debove. De l'ulcère simple de l'œsophage et le rétrecissement consecutif de cet organe, Gaz. hebd. de méd. et de chir., 2 Sept., 1887.

Eastman. Treatment by Direct Dilatation of Cicatricial Esophageai Stricture, Annals of Surgery, February, 1904.

v. Hacker. Die angeborenen Missbildungen, Verletzungen und Erkrankungen der Speiseröhre, in Hand. d. prakt. Chir., Bd. i.

König. Die Krankheiten des unteren Theils des Pharynx und Ocsophagus, Deutsche Chirurgie, Leif. 35.

Le Dentu. Note sur l'œsophagotomie interne à temps espacés au moyen de l'instrument de Maisonneuve modifié, Gaz. hebd. de méd. et de chir., 1887, p. 661.

Mackenzie. Gastrostomy, Œsophagostomy, and Internal Œsophagotomy in the Treatment of Stricture of the Œsophagus, The American Journal of Medical Sciences, 1883, p. 420.

Weber. Oesophagotomia interna, Eine histor. krit. Studie, Inaug. Diss., Leipzig, 1896.

PAROTITIS FOLLOWING INJURY OR DISEASE OF THE ABDOMINAL AND PELVIC VISCERA.¹

BY BRENNAN DYBALL, M.B., B.S., F.R.C.S., OF EXETER, ENGLAND.

Among the many complications which may be met with after operations on or diseases of the abdominal and pelvic viscera, one of the rarest, and at the same time one of the most interesting, is parotitis.

No distinctive name has as yet been given to this variety of parotitis. Secondary parotitis is too wide, as there are other varieties of secondary parotitis than the one now under consideration; postoperative parotitis is too narrow, as a fair number of instances have arisen in the course of disease of the abdominopelvic viscera without operation. The title of this paper, though it is accurate and embraces all the cases, is lengthy and cumbrous as a name, so, as the condition practically only follows lesions of the contents or of the wall of the coelom, this form of parotitis will, for the sake of brevity, be referred to in this paper as coeliac parotitis.

The reports of many of these cases are very imperfect, the occurrence of parotitis being often merely mentioned as an incident in the progress of the case, with no details as to date of onset, side affected, or occurrence of suppuration, etc.; but a sufficient number is reported with enough detail to enable conclusions to be drawn.

The primary lesions which give rise to cœliac parotitis cover a large field, and vary greatly in their nature and severity. In 1886, Stephen Paget¹ published abstracts of some sixty cases which he had collected, and in the following year published a statistical paper² based on reports of 101 cases. These he groups according to their cause, as follows:

¹ Read before the Devon and Exeter Medico-Chirurgical Society, April 15, 1904.

10 cases arose after disease or injury of the urinary tract.
18 cases arose after disease or injury of the alimentary canal.

23 cases arose after disease or injury of the abdominal wall, peritoneum, or pelvic cellular tissue.

50 cases arose after disease or injury or temporary derangements of the generative organs.

It will be seen that lesions of the generative organs account for half the cases, and of this proportion over twenty casesroughly 25 per cent. of the total number-occurred after removal of cystic ovaries. Nearly fifty more cases have been recorded since 1887, and when these are added to Paget's 101 cases, the proportion of cases arising after ovariotomy is somewhat lessened, which is only what might be expected from the greatly increased scope of abdominal surgery in the last fifteen years; but ovarian cysts still easily head the list of the causes of cœliac parotitis. Perforated gastric ulcer seems to come next in relative frequency, while the other cases have arisen after most of the ordinary abdominal operations, more rarely after disease of the various viscera without operation,—appendicitis, puerperal fever, intestinal obstruction, removal of Fallopian tubes, gastric ulcer (without perforation), and acute gastritis, to name but a few of the conditions; while a few cases have arisen after such trivial causes as the passage of a catheter, the insertion of a pessary, a blow on the testicle, menstrual disturbances, and the menopause. It is to this last group of trivial causes that Paget2 refers when he speaks of "temporary derangement of the generative organs."

The time of appearance of this parotitis varies considerably: it may come on as soon as the day following an operation, or as long as two or more weeks after. The greatest interval was in a case following removal of a huge hydatid of liver, the parotitis appearing fifty-four days after the operation and twenty-three days after the bladder had first been washed out for cystitis. No average time can be fixed for its appearance, but after operations on the pelvic or abdominal viscera the majority of cases have arisen in the first week; while those

following delivery or abortion usually appear in the second week.

In about one-third of the cases both parotid glands have been involved, the second following the first at an interval of about twenty-four to forty-eight hours, as in mumps. The bilateral cases are rather more frequent after ovariotomy than after other conditions (36 per cent. against 25 per cent.). When only one gland is affected, the right one suffers more frequently than the left; but there seems to be no relationship between the side operated on and the side affected by parotitis.

The parotitis may end by resolution in a few days, or may go on to suppuration, the latter being rather the more frequent; and Paget ² points out that suppuration always takes place when the patient is in a septic state. On the other hand, suppuration in the gland sometimes occurs when the seat of operation remains free from any signs of sepsis. Although suppuration is the more frequent ending, it is evident from what has just been said that it is not an essential feature of the condition, but is an accident due to the additional infection of the already inflamed gland; in most cases by a septic state of the blood, in others by the entrance of pyogenic organisms from the mouth viâ Stenson's duct.

As a rule, cœliac parotitis does not cause much constitutional disturbance: there is usually but slight rise of temperature, and high temperature or rigors due to the parotitis per se are quite exceptional; but considerable pain is common, and the appearance of a parotid bubo a few days after a patient has undergone a severe operation must always be a rather serious complication from its interference with feeding and from the effects of the pain, and in this indirect fashion may be sufficient to turn the balance against the patient. In Paget's 2 series, death occurred in thirty-seven cases; but he is careful to point out that in every instance this was due to the primary disease or operation and not to the parotitis. In one of his cases, however (No. 32 in the series), 1 it appears very probable, from the short account given, that the parotitis was directly responsible for the death of the patient, as the complication appeared six days after

an ovariotomy, suppuration occurred, and, spreading beyond the limits of the gland, set up a diffuse cellulitis of the neck. Up to the time of appearance of the parotitis the patient had had no rise of temperature and was apparently doing well. In another case, reported by the present writer, a right-sided parotitis occurred four days after an appendectomy: the inflammation was of a gangrenous type, and was undoubtedly the direct cause of death, as the patient's abdominal condition was perfectly satisfactory.

It will be evident that a study of cœliac parotitis is rendered difficult by the very conditions under which it arises, for the primary condition is usually a serious one, and overshadows and masks symptoms which may be due to the parotitis per se. The cases in which the parotitis follows "temporary derangement of the generative organs," though few in number, are therefore of great value, inasmuch as in these the symptoms due to the primary condition are practically nil, the parotitis stands out as the dominant feature, and can be studied with more exactness. A case of this nature has been recently recorded by Dalché, and will be very briefly described here, before proceeding to discuss the probable cause of this parotitis.

The patient, a woman of forty-four, had reached the menopause some months previously. For a year she had been subject to attacks of double parotitis, recurring usually every month, sometimes every six or eight weeks, rarely twice in a month. One parotid would quickly enlarge, and the other follow suit within twenty-four hours. The skin over the swellings was tense, red, and shiny; there was great pain but little or no fever. After two or three days the swellings would disappear as quickly as they came. The tongue was but slightly coated, there was no dryness of the mouth, and the teeth were in good condition.

The main interest of cœliac parotitis lies in its cause, and various theories have been put forward, none of which, however, give a satisfactory explanation of all the cases. The three chief are (1) the pyæmic theory, (2) the oral sepsis theory, and (3) the "reflex" theory.

(1) The first theory is that the parotitis is due to pyæmic infection of the gland.—in the old surgical sense of the term. be it noted, not in the modern and wider sense. This is most

difficult to accept. Five of Paget's cases certainly arose in the course of puerperal pyæmia, but, excluding these, there are considerably over 100 cases in which this parotitis was the only secondary symptom. Paget ² points out that in true surgical pyæmia a secondary abscess in the parotid is quite an exceptional occurrence; and it is impossible to believe that all these instances of parotitis were really cases of pyæmia in which the parotitis was the sole secondary symptom. Then in nearly half the cases the gland does not suppurate; and there are also a large number in which the operation area remains free from all sign of sepsis. Further, if pyæmic infection be the real cause, parotitis should surely be found arising occasionally as a solitary event after operations on other parts of the body; but such a case has yet to be recorded.

(2) The second theory is that cœliac parotitis is caused by infection of the gland by micro-organisms from the mouth via Stenson's duct, and at first sight this seems the obvious explanation. The mouth is always teeming with microbes; a study of the recorded cases makes it evident that in the majority, the patients, from the nature of the primary condition, must, before the onset of the parotitis, have had thickly furred tongues and coated buccal mucosa, with consequent increase in the number of organisms present; while in some cases an additional source of sepsis in the form of carious teeth has been noted. It is tempting to assume that in oral sepsis lies the cause of this parotitis, but a little consideration will show that it can hardly be the sole cause. In the first place, there are the cases following "temporary derangement of the generative organs," in which oral sepsis, or, at any rate, an increase in the oral septicity, can be practically excluded. Against the other cases being due to oral sepsis it may be urged that oral sepsis from carious teeth is only too common, but parotitis is never met with arising from this cause alone; and that in an immense number of cases of acute disease the patients have foul, dry tongues and mouths,—conditions which should be so favorable to the development of parotitis that, if buccal infection be the causa causans, parotitis could hardly fail to be a

fairly common occurrence in nearly all acute illnesses; indeed, one would expect it to be almost as common as acute otitis media in scarlet fever. In the typical case described above, such fleeting and repeated attacks of inflammation could scarcely, as Dalché 5 points out, be due solely to the action of buccal organisms. But one of the strongest arguments against this theory is the fact that the submaxillary and sublingual salivary glands are practically never affected, whereas on this theory one would expect to find them involved quite as frequently as the parotids. But, though oral sepsis cannot be the exciting cause, there is little doubt that it is the source of a pyogenic secondary infection of the gland in some of the suppurative cases. Organisms, no doubt, frequently make their way from the mouth to the gland, but, as is the case with other organs communicating by means of a duct with a mucous surface or with the exterior, the cells, when healthy, are able to deal with these intruders; but when their vitality is lowered by previous injury or inflammation, their bactericidal properties are impaired, a locus minoris resistentiæ is created, and the organisms are able to gain a hold and produce their specific effect

(3) The third theory—that cœliac parotitis is due to reflex nervous action—that it is, in fact, a "sympathetic" inflammation, has received considerable support from many writers on the subject. The argument in its favor may be briefly stated thus: the "sympathy" between the parotid glands and the genital organs is shown by the frequent occurrence of orchitis (or more rarely of oöphoritis or mastitis) as a complication of mumps; the fact that parotitis occurs after ovariotomy shows that this sympathetic current may be reversed: therefore secondary parotitis must be a reflex or "sympathetic" phenomenon.

Like the other two theories discussed, this one will not bear critical examination. In the first place, what evidence is there of a sympathetic nervous connection between the parotids and the generative organs? Of experimental proof there is absolutely none, so far as the writer can discover. The clinical

evidence rests chiefly on the occurrence of orchitis in mumps, though the salivation of pregnancy and the enlargement of the salivary glands met with in some of the lower animals during the breeding season are also adduced in support of the theory. One writer 6 on the subject says that the fact that orchitis occurs as often as once in every sixty cases of mumps is proof beyond doubt of a nerve connection between the parotids and the generative organs; another 7 says that "connection between organs as remote as those of the neck and those of the abdomen and pelvis can only exist through the medium of the sympathetic nervous system." One can only conclude that they have never heard of micro-organisms; and wonder if, in acute rheumatism, they regard the involvement of structures as remote from one another as the heart and the ankle- or knee-joints, as proof beyond doubt of a sympathetic nervous connection between them. The orchitis, as well as the other and rarer complications of mumps (meningitis, endocarditis, arthritis, etc.), will surely be more generally regarded as due to the action of the specific micro-organism (or its toxins) which is the cause of mumps, and whose seat of election is the parotid glands. It seems, therefore, that, in the absence of any evidence of a nervous tie between the organs, the reflex theory of the cause of coliac parotitis breaks down, at any rate as far as the pelvic cases are concerned. In the case of the alimentary canal, however, there is of course a nervous tie with the salivary glands, and the well-known fact that the secretion of saliva may be reflexly influenced by disease or injury of the digestive tract is adduced as evidence in support of this theory. But the undoubted fact that nervous impulses can control secretion is no proof that they can cause inflammation; indeed, all our knowledge of inflammation is opposed to this. It may, however, be urged that reflex action, by temporarily inhibiting the secretion of saliva and so rendering the mouth dry, merely opens a way for the entrance of micro-organisms from the mouth along Stenson's duct; but this is open to the same objections that can be brought against the oral sepsis theory,—that in an enormous number of cases of illness in which there is fever, the same

conditions are present, namely, deficient salivary secretion plus a septic state of mouth; but the buccal organisms signally fail to take advantage of the opportunities thus offered them for invading the parotid. Besides, it should be borne in mind that stimuli reaching the gland through the sympathetic cause constriction of the blood-vessels, and so prevent that congestion which is so favorable a predisposing cause to microbic invasion. Again, stimuli reaching the salivary glands from the alimentary canal in all probability affect all three pairs of glands, and we should therefore expect to find the submaxillary and sublingual glands involved fairly often; but, as a matter of fact, the number of cases in which they have been affected is so small as to be negligible. But more important than all is the fact that a secondary parotitis, similar in all respects to the cœliac variety, is met with in certain of the acute specific fevers, in which neither abdominal nor pelvic viscera are affected, and in which, therefore, this reflex action can be excluded.

If neither pyæmia, oral sepsis, nor reflex action be the cause of cœliac parotitis, to what must we look for the explanation of this interesting condition? Dalché,⁵ in commenting on his case of climacteric parotitis mentioned above, compares the parotitis with the congestive disturbances of other organs sometimes met with at the menopause, or in association with menstrual disturbances, and, after a cautious discussion of the various theories, none of which he appears to accept, concludes his paper with these words: "One thinks more readily that it arose primarily from vasomotor disturbances, aroused perhaps by a genital autointoxication." The writer believes that this suggestion gives the clue to the cause of all the cases.

Besides the action of the nervous system, a tie between organs remote from one another may be brought about by chemical agency, and in following up Dalche's suggestion it is necessary to see, firstly, if parotitis can be caused by the action of toxic substances; and, secondly, if in cases of cæliac parotitis there is any evidence of toxic substances being present in the blood. It may be said at once that there is evidence in favor of both these points. In the first place, in mumps (to which many

cases of cœliac parotitis have a strong resemblance) we have a parotitis due to the action of toxic material of microbic origin. Then there is the secondary parotitis met with in cases of chronic poisoning by lead, mercury, copper, and iodine; and that substances like this can cause a very acute inflammation is shown by a case of parotitis due to poisoning by iodide of potassium mentioned by Comby,8 in which the swelling of the glands reached a maximum in a few minutes. Lastly, there is the variety of secondary parotitis met with as a complication of certain acute specific fevers, namely, in enteric fever, cholera, typhus, small-pox, pneumonia, cerebrospinal meningitis, and (exceedingly rarely) in scarlet fever. In the first two the alimentary canal is, of course, involved, but in the others neither abdominal nor pelvic viscera are affected, and therefore the reflex theory cannot be invoked. Now it is in some of these diseases that secondary parotitis is most frequently met with: in enteric fever it occurs in 2 per cent. of the cases; in cerebrospinal meningitis it is said to be fairly common, and in typhus (a toxæmic and septicæmic disease par excellence) it reaches its greatest frequency, about 5 per cent.; while after abdominal operations its incidence, at the most liberal estimate, cannot be I per cent.; and if every case of abdominal and pelvic disease be added, its frequency, of course, is enormously decreased. Now the one condition which characterizes all these widely different specific diseases is that in all of them toxic substances are present in the blood; and the writer submits that it is these toxic substances which are the cause of the parotitis, which appears, as a rule, about the height of the disease, or, in other words, when the toxic material is present in greatest abundance. It will, of course, be objected that the parotitis is due, not to the toxins in the blood, but to the septic state of the mouth which is so frequently present; but that this is not really the case is shown by the fact that parotitis is not met with in other acute infectious diseases, such as acute rheumatism, yellow fever, and diphtheria, in all of which, and especially in the last, the mouth is in a septic state; nor, as already pointed out, is it met with in the numberless other cases of acute disease

in which an equally foul condition of the mouth is found. Further, in those infectious diseases in which parotitis occurs, its different frequency in the various diseases can hardly be explained by differences in oral septicity, while it can easily be explained on the assumption that the parotid is more readily affected by the poisons of some of these diseases than of others; and it is noteworthy that in the two diseases which are frequently marked by extremely septic mouth, namely, scarlet fever and diphtheria, parotitis is respectively extremely seldom and never found. It may therefore be taken that the variety of parotitis met with as a complication of many of the acute specific fevers is due to the action on the gland of toxic materials present in the blood; and it will also be seen that the parotid gland is an organ which is very susceptible to the action of a number of different poisons.

As regards the second point, whether there is any evidence of toxic material being present in the blood in cases of cœliac parotitis, it is necessary to examine the records of the These show that over 20 per cent. arose in connection with cystic disease of the ovaries. Now the descriptions given in the older works on gynæcology of the constitutional effects of long-standing cases of ovarian cysts, make it quite clear that toxic materials are formed by and absorbed from them in abundance. Nearly as large a proportion of the cases has occurred in connection with other forms of ovarian disease. Now we know that many of our organs manufacture internal secretions which are capable of exerting considerable influence on other parts of the body, and that these secretions are modified by unhealthy conditions of the organs producing them. That the ovaries, and also the testicles, normally produce such substances is beyond dispute; one has only to study the results of their removal when functionally active to see this; while possibly the swelling of the thyroid often met with at the menstrual periods, and the many congestive disturbances which may occur at the menopause, are instances of the action of the ovarian secretion; and Paget 1 mentions a significant case in which parotitis occurred at several successive months in place

of the menstrual period. It seems quite possible that the secretion of these genital glands, modified by injury or disease, and of the ovarian cysts, may be irritating to the parotids, and may cause them to become inflamed. Turning to the alimentary cases, it is noticeable that in half of them peritonitis was present, and we know too well that in this condition there is free absorption of toxic material; while in some cases the bacillus coli may possibly be present in the blood. In the alimentary cases without peritonitis there were, in practically all, such conditions as gastric ulcer, intestinal obstruction or malignant growth in the bowel, in all of which there would consequently have been derangement of digestion and usually increased absorption of intestinal contents. A perusal of the effects of the absorption of intestinal contents given by Bouchard 9 in his work on "Autointoxication" makes it clear that no stretch of imagination is needed to believe that this cause may also be responsible for the production of parotitis; and bearing on this, a case seen by the writer a few years ago is very suggestive, as the parotitis arose in a patient suffering from ptomain poisoning from tainted meat, and in whom local symptoms were very slight, but the constitutional effects of the poison were marked. In the uterine cases it is most probable that the interference with the uterus has a reflex effect upon the ovaries, and so causes a modification of their secretion. This may also be the explanation of the cases arising from puerperal sepsis, or the infection in these cases may have been due to the colon bacillus. The latter view seems to be favored by the fact that, as pointed out above, parotitis does not appear, as a rule, until the second week, which may be due to the septic process in these cases not becoming established so quickly as when it occurs after abdominal section. As to the small remaining group of cases arising after operations on the male bladder, there was cystitis or residual urine in all those of which details are given: the contents of the bladder would in these cases form the source of the toxic material, and probably the slight damage to the mucous membrane caused by the catheter or sound opened up

a path for absorption. This is rather borne out by a case lately related to the writer by a friend, in which parotitis followed a suprapubic prostatectomy.

The writer ventures to hope that enough has been said to show that in all the recorded cases of cœliac parotitis there is actual or presumptive evidence of the presence in the blood of toxic materials: there is, of course, no proof that any of these substances are the cause of the parotitis, but, taking the facts in conjunction with what has been shown of the susceptibility of the parotid gland to various other chemical substances, it is surely justifiable to regard this explanation of the cause of cœliac parotitis as correct.

A few possible objections may now be dealt with. first is that, if coliac parotitis be due to toxins, it should always be bilateral, since both glands are equally exposed to the action of the toxins; but this objection has no weight, for in other conditions in which bilateral organs are equally exposed to certain influences, it is quite common for only one to be affected. For instance, in mumps, both testicles are equally exposed to infection, but it is usual for only one to be attacked. Again, in the parotitis due to chronic poisoning by mercury, lead, etc., though it would appear that both glands are always involved, there may be an interval of several weeks between the involvement of the two sides; and in these cases it must be remembered that the action of the poison is continued for a considerable time, while in cœliac parotitis the toxic material has usually but a few days in which to act. Possibly a larger dose or more prolonged action is necessary to affect both sides, and this is rather borne out by the fact that double coliac parotitis occurs most often in connection with ovarian discase, in which absorption has been going on for a longer period than in most of the other cases.

The next objection is that on this autointoxication theory the parotitis should be a frequent occurrence, but its rarity is more difficult to explain on the other theories discussed. On the oral sepsis theory, one would expect it to be fairly common: on the reflex theory it should be the most frequent complica-

tion of abdominal and pelvic diseases; in fact, as Dalché 5 pertinently remarks, "it is strange that these (nerve) connections so seldom exert their influence." The objection is easily overcome by the autointoxication theory. In the first place, one would not expect the parotitis to arise after a simple abdominal section with but little handling of bowel, no soiling of the peritoneum, and no subsequent peritonitis; and so far no case has been reported as following such an operation. In cases in which peritonitis is present, or in which there is disease or injury of secreting organs, but in which parotitis does not occur, it is quite justifiable to assume that the particular toxic materials are not formed or absorbed in sufficient quantity to affect the parotid; or that they are excreted or neutralized before they can affect the gland. Only a few cases of chronic lead-poisoning develop parotitis. No one doubts that postdiphtheritic paralysis is due to the toxins of the diphtheria bacillus, because it only occurs in a small percentage of the cases

The last objection is best expressed by the query, Why should these toxic substances pick out the parotid glands of all organs and affect them only? To this it can only be answered that the cells of certain organs will react to certain poisons, while the cells of other organs remain unaffected. It is not considered necessary to explain why the toxins of scarlet fever should have such a marked effect upon the kidneys; or, to take a more particular instance, why atropine should pick out and paralyze the endings of the third nerve in the iris.

To sum up:

- I. It appears most probable that cœliac parotitis is due to the action on the parotid glands of toxic substances absorbed into the blood and derived from (a) the secretions of certain organs modified by injury or disease; (b) toxins of microbic origin (e.g., bacillus coli) absorbed either from the alimentary canal, peritoneal cavity, or bladder; (c) products of deranged digestion.
- 2. In any given case of injury or disease of the abdominal or pelvic viscera, the occurrence or not of parotitis will there-

fore depend on the presence and the absorption in sufficient quantity of some of these various toxic agents.

3. Suppuration is not an essential feature of the condition, but is due to the fact that the parotid gland, when inflamed by the action of these toxic agents, forms a *locus minoris resistentiæ*, and becomes secondarily infected by pyogenic organisms reaching it (a) by the blood-stream; (b) by Stenson's duct.

In conclusion, while this theory, like the others discussed, is not capable of proof at the present time, the writer ventures to submit that it is one which affords an explanation of all the cases, and which is in accordance with our present knowledge of pathology.

REFERENCES.

- ¹ Paget. Secondary Inflammation of the Parotid, Lancet, Vol. i, 1886.
- ² Paget. Parotitis after Injury or Disease of the Abdomen or Pelvis, Transactions of Medical Society, 1887.
- ^a Robinson. Case of very Large Hydatid Cyst of Liver, Transactions of Clinical Society, Vol. xxx.
- ⁴ Dyball. A Fatal Case of Secondary Parotitis, British Medical Journal, Vol. i, 1904.
- ⁶ Dalché. Parotidite d'Origine génitale à la Ménopause, La Gynécologie, 1903.
- ⁶ Brewis. Parotitis following Operations on the Abdominopelvic Viscera, Transactions of the Edinburgh Obstetrical Society, 1892.
- ⁷ Morley. Parotitis following Abdominal Section, American Gynzcology, 1902.
- ⁸ Comby. Les Parotidites Toxiques, Med. Mod., Paris, 1897.
- Bouchard. Autointoxication in Disease. (Translated by Oliver.)

DUODENAL ULCER.

A CLINICAL REVIEW OF FIFTY-EIGHT OPERATED CASES, WITH SOME REMARKS ON GASTROJEJUNOSTOMY.

BY WILLIAM J. MAYO, M.D.,

OF ROCHESTER, MINN., Surgeon to St. Mary's Hospital.

DUODENAL ulcer has been considered a rare malady, and surgically has not received the attention its importance merits. Weir, in a masterly paper before the American Surgical Association, in May, 1900, analyzed the cases reported in literature, and with observations drawn from his own experience placed the subject on a sound foundation. Interest has been still further quickened by a number of workers, notably, Murphy and Brunner.

It has been stated that nearly all duodenal ulcers are secondary to gastric ulcers, and that the two are usually combined in the one case. This has not been entirely borne out by our experience, at least the gastric ulcer, if present, has not been of the same grade and character as the duodenal. It is of course possible that a round or fissure ulcer of the stomach might have existed without recognition from the exterior of the stomach wall.

Based on the same examination in ten out of our fifty-eight cases of duodenal ulcers, there was a separate, distinct ulcer found upon the gastric wall. In eighteen cases the pylorus was involved by a lateral extension of the duodenal ulcer, making twenty-eight out of fifty-eight, or about 50 per cent. cases of chronic gastric and duodenal ulcer recently reported by Moynihan (Annals of Surgery, May, 1904), twenty-two involved the duodenum, in nine the lesion was confined to the duodenum, and in thirteen, separate and distinct ulcer existed upon both gastric and duodenal walls. Up to two years ago, 11 per cent. of the gastric and duodenal ulcers which came under our care involved the duodenum, 89 per cent. the

stomach. During the past year, with more careful observation, we find 27 per cent. duodenal alone, or combined with gastric ulcer. This includes a numerous group of duodenal ulcers which extend up to and involve the pyloric ring.

We have seen a number of pyloric ulcers due to lateral extension and involvement of a gastric ulcer, and in several of these the duodenum was attacked on one margin. In others the gastric wall was involved in a duodenal ulcer, the classification of gastric or duodenal being based upon the extent of the In all of the cases of duodenal ulcer with five exceptions, the ulcerated area was easily identified as a thick, opaque spot, puckered in appearance, and usually covered by peritoneal adhesions, closely resembling the large, irregular gastric ulcer of Robson, and likewise it has been more frequent in adult males. Seymour Taylor, in this variety of gastric ulcer, found seventy-two males to twenty-eight females. the series of fifty-eight duodenal ulcers herein reported, fortythree were in males, fifteen were in females. In two of the acute perforating cases the ulcer was clean, clear cut, and set in normal tissues; in four the perforation was through a thickened area. In the chronic cases a few completely surrounded the duodenum, in others the outlines were irregular and of various sizes and shapes, and in the smallest at least one centimetre in diameter. Most of them involved a considerable extent of intestinal wall. The five cases without any appreciable thickening are of great interest; of the two acute perforations just referred to, one gave a history of four years' chronic trouble; the second of but two weeks; no other ulceration of either stomach or duodenum could be detected. In the third there was chronic hæmorrhage with acute exacerbation; the fourth case, in which gastro-enterostomy was done, died six months later from another cause, and post-mortem did not disclose macroscopic evidence, at site of previous slight thickening, of any defect in the mucous membrane; the fifth case was buried in adhesions, evidently there had been a minute perforation, which, however, could not be identified. This would seem to indicate that typical round ulcer of many years' standing

may exist without involvement of the outer coats, and therefore give little or no external evidence of disease, just as happens in the stomach. It is probable, however, that most duodenal ulcers are of the cicatricial type, and in our series there has been a relatively greater tendency to perforate than in gastric ulcer. This is shown by the peritoneal adhesions which are so often found, and by the frequency of what may be called chronic perforation, protected by a mass of adhesions to the liver, gall-bladder, or gastrohepatic omentum. These structures often form a plaster over the perforation and protect against extravasation of bowel contents. Such chronic perforations were found in ten of the fifty-eight cases. patients did there appear to be more than one ulcer of the duodenum, and in one of these there was some question as to whether there was not some connection between. In two cases of supposed gall-bladder disease, which we had opened and drained on account of adhesions thought to be due to cholecystitis without stones, no relief followed, and reoperation became necessary. At this time more careful investigation revealed duodenal ulcer.

In a previous paper (Annals of Surgery, July, 1903), the writer referred to four cases of periduodenitis of unknown origin, operated upon for supposed gall-bladder disease, and in which the condition of the gall-blader did not bear out the presumption. One of these cases has since been reoperated and duodenal ulcer found.

Considering the known errors and the possibilities springing from a predetermined gastro-enterostomy and imperfect examination of an ulcer situated in the pyloric region, it must be evident that duodenal ulcer is a far more common condition than has been thought. The situation of the duodenum renders it especially liable to erosion from irritating gastric secretions which the thinness of its tunics enables it to resist but feebly. Its sheltered situation fortunately enables protective adhesion in many cases, while its limited capacity and freedom from obstruction beyond prevent tension. The normal condition of relatively sterile contents, especially in the class of cases under discussion, is also a favorable circumstance.

All the cases of duodenal ulcer occurred in the first two and one-half inches of the bowel, and entirely above the entrance of the common duct, and therefore in an accessible situation. These errors should be largely eliminated, and in all doubtful cases of gall-stone disease and gastric ulcer in which duodenal ulcer is possible, the first portion of the duodenum should be inspected. For this reason, we now employ a longitudinal incision one inch to the right of the median line through the rectus muscle. This enables careful examination of the duodenum, gall-bladder, stomach, and pancreas. If more space is needed, Bevan's lateral cured prolongation of the incision at either the upper or lower end or both, gives additional access to these organs. Longitudinal incisions through the body of the muscle close well, and are more reliable against hernia than when located in the median line.

The operative indications are few. The causation and continuation of duodenal ulcer depends on the irritating gastric secretions. These must be diverted by a gastro-enterostomy. If acute perforation exists, suture of the opening and cleansing of the infected area in the peritoneal cavity combined with gastro-enterostomy, if the patient's condition warrants it, best fulfils the indications. Should there be extensive peritonitis, pelvic drainage and the nearly sitting posture (exaggerated Fowler position) should be instituted for a few days following operation. For convenience, the fifty-eight operated cases are divided into five groups: 1st, Acute perforation; 2d, Hæmorrhage; 3d, Chronic ulcer with gastric complications; 4th, Chronic perforating ulcer with gall-bladder and liver complications; 5th, Chronic ulcer requiring operation for relief of pain and distress.

Group One. Acute perforation, six cases, two deaths. Acute perforating ulcer was found six times, in all but one a complication of chronic ulcer with a history of four to twenty-one years' standing. In four there was some attempt at adhesions, the acute perforation evidently occurring at a site of a partially protected area. In four of these patients there was a considerable sized opening found. In two, already referred to.

there was a clean cut perforation through what was otherwise normal bowel wall. In four suturing was easy, in two difficult and unsatisfactory, requiring gauze packing. One of these cases died from inanition from prolonged leakage, although a gastro-enterostomy was done at the same time. In the other the gauze pack was left undisturbed eleven days and rectal feeding employed for five days. The leakage was but slight and the fistula soon closed. In four the suturing held perfectly, but, unfortunately, one died from pneumonia on the tenth day. this patient a gastro-enterostomy had also been done. conditions were unusually favorable for an operation, which was performed within two hours of the accident, and the gastroenterostomy was considered advisable, as it seemed certain that stenosis would follow, as it had existed previously. Superficially, this would seem to argue against gastro-enterostomy in acute perforation, but in each case the post-mortem showed the gastro-enterostomy to be perfect.

Group Two. Hæmorrhage, one case, one death. There was a single case of prolonged and repeated hæmorrhage in a chronic ulcer of three years' duration; during a two weeks' period of observation the stools showed constant evidence of blood. There was a single hæmatemesis. The ulcer was easily recognized as a little thickened patch of otherwise normal bowel wall, and was excised with pyloroplastic enlargement. The man was markedly anæmic and a poor subject for anything but a forced operation. Valuable time had been lost in attempting to build him up. Death from pneumonia occurred on the fifth day.

Group Three. Duodenal ulcer with gastric complication, twenty-eight cases, one death. Chronic ulcer with stomach complications from interference with gastric drainage was the most frequent form met with, and gastro-enterostomy was performed with recovery in each instance, excepting one in which acute obstruction of the transverse colon followed anterior gastro-enterostomy. At post-mortem a long prolapsed transverse colon was found hanging over the jejunal loop as it would

over a clothes-line. The symptoms were not acute until a few hours after death. Reoperation should have been done.

Group Four. Duodenal ulcer with gall-bladder and liver complications, eleven cases, one reoperation, no death. In this series gastro-enterostomy was performed in seven cases with successful outcome. In four cases, plastic operation was resorted to with or without excision of the ulcer. In three a modified pyloroplasty, one after the plan of Heinicke-Mikulicz with a poor result, a secondary gastro-enterostomy being required within three months, the other two after the plan of Finney and with success. In the third the duodenum, at a point two inches from the pylorus, was acutely flexed upon itself by adhesions to the liver, due to a closed adherent perforation. This made it possible to do a plastic operation upon the first portion of the duodenum without disturbing the adhesion.

Group Five. Thirteen cases, no death. In this small series only were there symptoms calling for operation which did not involve the stomach or gall-bladder, and still further emphasizes the fact that it is usually the complication which hastened operation. In practically all of these cases adhesions marked previous attacks of regional peritonitis. Gastro-enterostomy was performed in each with good results.

To recapitulate, there were fifty-nine operations in fifty-eight cases. Of these seven were for acute conditions developing, with one exception, upon chronic ulcer with three deaths. Fifty-one operations for chronic conditions gave one death. At the present time posterior gastro-enterostomy would appear to be the operation of choice in the chronic cases, but the last word has not yet been said. The time elapsed since operation in the majority of the cases herein reported suggests the possibility of further sequelæ, particularly in those cases in which there is no obstruction, and in which experience has taught us that at least partial closure of the gastro-enterostomy opening may take place. It is pretty certain that even with a large gastro-enterostomy the food will pass out by preference through an unobstructed pylorus by muscular action, the apparent grav-

ity advantage of a low-point gastro-enterostomy being equallized by intra-abdominal tension. Gastro-enterostomy performed for gastric ulcer is open to the same objection if there be no stenosis. For this reason, when the ulcer does not cause at least partial obstruction, it may be necessary to artificially block the pyloric outlet.

An occasional complication following gastro-enterostomy is bile regurgitation into the stomach. Acute vicious circle will seldom be seen if the opening be made at the bottom of the gastric cavity. We had but one case in 316 gastrojejunostomies (excluding our first fourteen cases), and that one in a patient eighty years old. Chronic bile regurgitation is a more frequent condition, beginning, as Ochsner points out, within three months, if at all, although it may be a year or more before it gets troublesome.

Carle and Fantino have shown that a little bile is to be found in the stomach at times in nearly all cases after gastrojejunostomy, and state that it does no harm. We have had a number of patients complain bitterly of the distress occasioned. As a rule, the food passes out quickly, but there will be attacks of biliary regurgitation at intervals of days or weeks. We have observed this phenomenon after the various methods of operation, and have been compelled to reoperate a number of times to check the disturbance. If the patient is in good general condition, we now perform a posterior suture gastro-enterostomy with a nine- or ten-inch loop, after the clamp method introduced into this country by Moynihan (Transactions of American Surgical Association, 1903). Four inches below the completed gastro-enterostomy an entero-anastomosis with suture between the two limbs of the bowel is made, using the holding clamps. This adds ten minutes to the operation. A medium Murphy button is preferred by many surgeons for making the entero-anastomosis. To do this, the intestinal clamp is removed after the two posterior rows of sutures are introduced in the gastro-enterostomy and half the button passed down inside each limb through the incised jejunum to a point previously marked with the knife. The intestine is nicked, and the proper



Fig. 1 —Ulcer of duodenum Pylorus blocked by infolding method A Sutures in place but not tred Methods B and C at point marked XX

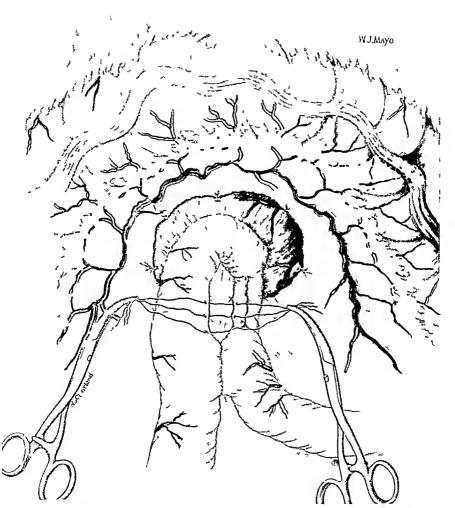


Fig 2—Posterior gastro enterostomy with entero anastomosis and infolding, sutures placed for obliterating intestinal interspace. X marks site of silver-wire constriction or complete division. Note that the drawing shows stomach and colon drawn outward and upward as in actual operation. Replacement of viscora reverses position and brings intestinal opening at the bottom of gastric cavity.

part of the button forced through and juncture made without a puckering suture (Weir). This adds about three minutes to the time.

A few mattress sutures should be placed as a protection about the button if it is employed. The only patient we lost in the last sixty-one gastro-enterostomies at St. Mary's Hospital was one in which the button union gave way suddenly on the sixth day, the patient having not a bad symptom up to that time. Secondary laparotomy was performed ten hours later, but the patient died. After completing the button entero-anastomosis, the gastro-enterostomy is finished in the usual manner, and the opened mesocolon attached to the posterior wall of the stomach in several places.

To prevent bile arising to the level of the stomach and also to cause the food to always pass out the efferent bowel, the afferent intestine between the entero-anastomosis and the gastro-enterostomy should be closed in one of three ways. Method (a). Infolding may be practised after the plan of Scott-Matolli, a continuous linen or silk suture an inch and a half in length turns the periphery of the intestine into the lumen. (Fig. 2.) Method (b). Fowler accomplishes the same result by passing a No. 20 silver wire twice about the afferent loop at point X (Fig. 2), and twisting tight enough to obstruct without injury to the circulation, the twisted ends of the wire being turned closely into the wire loop (Transactions of American Surgical Association, 1902). Methods (a) and (b) prolong the operation about three minutes. Method (c). We have in some secondary operations completely divided the afferent intestine at point X (Fig. 2), closing both intestinal ends by a circular suture (Doyen), making the separation absolute; operation prolonged five to eight minutes. In all cases the open space between the two limbs of the intestinal loop should be partially closed by a few sutures at its lower part to prevent a coil of bowel herniating into the opening (Fig. 2).

A comparison shows the infolding method to be the easiest, but Crile had a case in which, after a time, the infolded intestine straightened out and required another operation. The Fowler

method is evidently more certain. The Doyen operation is of course sure, but takes a little more time and adds somewhat to the gravity of the procedure. When finished, however, it has all the advantages of the "Y" operation of Roux.

Closure of the pylorus to divert all the food to the gastro-enterostomy is under consideration, and probably should be done in the large majority of cases if there is no cicatricial obstruction. The three methods already described for closure of the afferent intestine apply equally to the pylorus. The infolding method is shown in Fig. 1. The point for the application of the Fowler loop or complete division is shown by X (Fig. 1). We have either infolded or divided for the purpose of obstructing the pylorus. Ochsner has used the wire loop a number of times successfully for this purpose.

The entire time of the combined operation should not exceed thirty-five to fifty minutes, according to the method chosen, and including opening and closing the abdomen. In view of the fact that gastro-enterostomy is no longer a last resort, but an operation of choice to promote comfort and relieve disability, we must not only give a low mortality rate, but also a high percentage of permanent cures.

The cases above reported were operated upon in St. Mary's Hospital by Dr. Charles H. Mayo or the author.

TETANY, AND FOREIGN BODIES IN THE STOMACH.

TETANY CAUSED BY A MASS IN THE STOMACH, COMPOSED OF FORTY METALLIC ARTICLES, WEIGHING ONE POUND; GASTROTOMY; CURED.

BY JAMES P. WARBASSE, M.D.,

OF NEW YORK,
Surgeon to the German Hospital, Brooklyn.

In 1869, Kuessmaul and Neumann showed that certain gastric disturbances, notably dilatation of the stomach, bore an etiological relation to tetany. Since that time a sufficient number of cases have been observed and added to the literature, to show that dilatation of the stomach, with or without pyloric obstruction, particularly when associated with abnormal retention and fermentation of food, is a cause of tetany. The cases which have supported this conclusion have also been of importance, because they have made possible a more accurate study of tetany, a complex train of symptoms which previously had been confused with tetanus, epilepsy, and other nervous phenomena.

The most acceptable theories concerning the cause of these attacks are those which attribute them to autointoxication from fermentation of stomach contents and irritation of nerve endings in an already poisoned organism. The characteristic attacks of convulsions usually follow an effort of the affected stomach to empty itself. A patient, who has suffered with chronic atony of the stomach, or dilatation from narrowing of the pylorus, and abnormal fermentation of retained food, after an effort at vomiting, or the passage of the stomach-tube, is seized with a convulsive paroxysm similar in some respects to both that of epilepsy and tetanus. A great variety of spasms have been described by different observers. The characteristic attack begins with tetanic spasms of the muscles of the forearm and hand or abdominal muscles, and is rapidly followed by

tonic contractions of the muscles of the extremities, back, and neck. Usually there is loss of consciousness. The picture is often that of epilepsy with tetanic contractions of the muscles of the limbs and back. There seems to be no typical course of the convulsive movements. A peculiar position of the hand in these attacks is described as accoucheur's hand, the metacarpophalangeal joints being flexed, the phalangeal joints extended, and the thumb adducted.

The mortality among these cases under medical treatment is reported to be 88 per cent. Of the cases operated upon, nine in all (including the case herewith reported), the mortality is 33 per cent.

Kuchein (Berliner klin. Wochenschrift, November 7, 1898) has reported a case due to carcinoma of the pylorus, associated with gastric dilatation. He attributed the tetany in this case to increase in the specific gravity of the blood because of the diminished absorption of fluids. This is in sympathy with the original views of Kuessmaul. Juergensen has reported a similar case (Archiv für klin. Med., Vol. lx). He attributes the symptoms to autointoxication. Sievers (Berliner klin. Wochenschrift, August, 1898) collected reports of twenty-seven cases, three of which were associated with carcinoma of the stomach. The majority of cases of gastric tetany have been found complicated with dilatation of the stomach, following pyloric stenosis due to gastric ulcer.

Mayo Robson, who first presented the surgery of this condition, regards autointoxication from gastric fermentation as the predisposing cause; and the exciting cause he believes to be the reflex irritation caused by painful contraction of the stomach. Albu, Germain-See, and Berlizheimer have recognized the importance of mechanical gastric irritation as an etiological factor. Blazicek has reported a case in which the dilatation of the stomach was due to duodenopyloric obstruction from the pressure of a large gall-stone; and Berlizheimer has reported a case in which the same condition was due to the pressure upon the duodenum of a pancreatic cyst. I have been unable to find in the literature the report of any case due to foreign bodies in the stomach.

Cunningham, in an admirable paper on this subject in the Annals of Surgery, April, 1904, to which the reader is referred for literary references, records the seven cases which have been treated surgically, and adds to these an eighth case from his own observation. Three of these cases were reported by Mayo Robson, two by Fleiner of Heidelberg, one by Gumprecht, and one by Caird. Robson's cases were due to cicatricial stenosis of the pylorus, and were treated by pyloroplasty, the third case requiring a subsequent gastro-enterostomy. All were cured. The first of Fleiner's cases was due to sarcoma of the pylorus, and died after gastro-enterostomy. Fleiner's second case was due to inflammatory stenosis of the pylorus, and was treated by pyloroplasty. This case died ten days later. Gumprecht's case was one of cicatricial stenosis of the pylorus. It was treated by resection of the pylorus, and died of general peritonitis. Caird's case, reported by Dickson, was one of inflammatory stenosis, and was cured by gastrojejunostomy. The case reported by Cunningham, and operated upon by Watson in the Boston City Hospital, was one of cicatricial stenosis, and was cured by gastro-enterostomy.

The following case, which I operated upon in the German Hospital in Brooklyn, is of importance because the gastric tetany was caused by foreign bodies in the stomach, and was not associated with obstructive disease of the pylorus or obstructive dilatation in the ordinary sense of the term,—two conditions which had heretofore been regarded as concomitants of gastric tetany. The case is also of interest because of the number and character of the foreign bodies, and the information which it contributes to the physiology of the stomach.

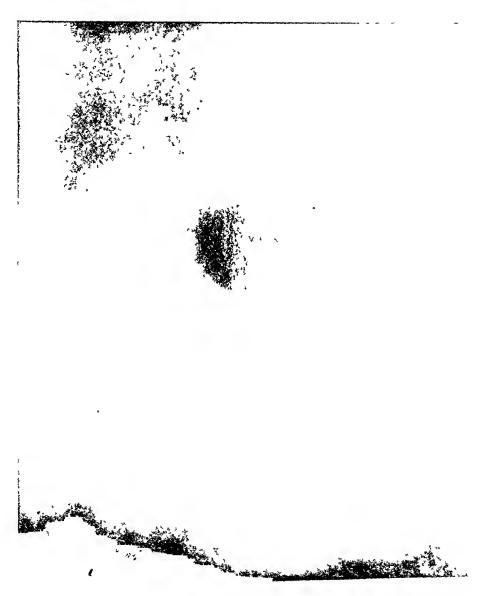
J. F., male, twenty-three years old, German, married, tailor, entered the German Hospital, May 1, 1904. Healthy, well-developed man. No venereal history. No previous illnesses or family history of epilepsy. Drinks beer moderately. Married four years. Wife has one child two years old. Appetite always good. No eye symptoms.

In 1897 he began giving exhibitions swallowing metallic objects, such as nails, pins, and other small articles. He did not

swallow many of these things at one sitting, and usually found them in the bowel movements within twenty-four hours. He continued giving these exhibitions, as a means of livelihood, without mishap until August, 1900, when he fell in an unconscious state after having swallowed several nails and a watch-chain. In this attack there were severe abdominal cramps, and he was removed to St. Catherine's Hospital. No satisfactory history of this attack is obtainable. He did not remain in the hospital, but immediately resumed his occupation of giving exhibitions. In September following, he was particularly busy, swallowing as many as twenty ordinary pins, together with hair-pins and wire nails, during the course of an evening's entertainment. These things he believed all passed per anum. On one evening he swallowed eighty pins.

On December 16, 1900, after swallowing two or three watchchains, he had another attack of unconsciousness, with convulsions, which had been preceded by violent vomiting. He was removed to St. John's Hospital, where he was retained for five weeks. During the first two weeks at the hospital he continued to pass metallic articles which he had swallowed. He complained of epigastric cramps, and during the time had a number of convulsive seizures. These he describes as following vomiting. Some of the convulsions were extremely violent. He had such a convulsion on January 2, completely turning around in bed until his head was at the foot. The following day a gastrotomy was done, and the following articles were removed: one hundred and twenty-nine ordinary pins, five hair-pins, two horse-shoe nails, twelve wire nails, two keys, and two watch-chains. He made a good recovery, and was discharged three weeks later. No satisfactory history of the tetanic seizures is obtainable. In these attacks pain was not a symptom. It is spoken of by those who saw him in convulsive attacks, because the attacks were wrongly supposed to be manifestations of pain.

He continued in fairly good health. He followed his vocation, swallowing articles passed up from the audience, and was known as the "human ostrich." He increased the number and size of articles consumed, but had no bad immediate attacks. He has suffered with frequent cramps in the calf of the right leg during the past two years. This cramp often awakened him from sound sleep, and was so severe that he would jump out of bed and walk in order to get relief. Coitus was always followed in



 $\Gamma_{\rm IG}/r$ —Showing mass of metallic materials lodged in cardiac end of storic h

	* .	
		•

about five minutes by this cramp. During the past year he has had a choking sensation and difficulty of breathing, apparently due to spasms of the throat muscles. This choking sensation was frequent and annoying. He also had occasional cramps in the muscles of the back.

On July 16, 1903, while on a street-car, he was seized with a convulsion, and fell from the car. He was removed to the German Hospital, where he had several such attacks. He remained in the hospital only over night. On March 12, 1904, he swallowed six horse-shoe nails, eight wire nails, two padlock keys, one large brass key, and one pocket-knife, and had a tetanic attack. Several of these articles failed to appear in the stools. On April 30, 1904, he swallowed some nails, keys, and two watchchains. While still on the stage he was seized with vomiting, spasm of the throat muscles, and fell unconscious in a tetanic attack. He was removed to the German Hospital.

In this, as in the previous attack, there was a succession of spasmodic seizures. Practically, all of the voluntary muscles were involved,—legs, arms, neck, face, and extensors of the trunk. Often the contractions of the extensor muscles of the spine and legs were so strong as to cause the whole body to bound from the floor in a position of opisthotonos.

Sometimes during the intervals between attacks the patient regained consciousness, and entered into conversation, at other times the spasms followed in quick succession. These seizures presented three stages: (1) All of the attacks were preceded by vomiting or a violent effort at vomiting. (2) This was always followed by a sensation of choking, as though he were being strangled, and could not get air,—evidently a spasm of the glottis muscles. (3) He then fell unconscious to the floor, and the convulsions immediately supervened. During the first two stages there was always a sensation of dizziness. After from one to six or eight convulsions the attack subsided, and the patient went about his business.

Fluoroscopic examination and an X-ray picture (Fig. 1) showed a mass of foreign matter in the region of the cardiac end of the stomach. This mass was in the form of a ball or nest; no separate foreign substances could be detected in any other location. Further examination on the following day showed the abdomen to be flat and free from peritoneal irritation. There was slight ten-

derness over the cardiac end of the stomach. The patient's general physical condition and morale were excellent. There was a scar of median operation above the umbilicus.

Operation, May 3. Abdomen opened through left rectus muscle, and stomach brought into wound. Stomach secured with two supporting silk sutures. Transverse opening made in stomach over cardiac end. The hand introduced in this opening discovered a mass of metallic substances felted together and bound by chains into a nest. This was separated, and the following articles removed (Fig. 2): Seven pocket-knives, seven door-keys, twenty nails (two and one-half inches long), one small spoon, one button-hook, an ordinary pin, a knife-spring, and two watch-chains (one gold-plated, the other silver). The total weight of these things was sixteen ounces. The mucous membrane of the stomach appeared slightly congested, but otherwise normal. The musculature was apparently not hypertrophied. There were no peritoneal adhesions or evidences of irritation, excepting the adhesion of the stomach to the former scar. There was some dilatation of the left end of the stomach, induced by the weight of its contents and the ineffectual efforts of expulsion. The adhesion of the stomach to the former scar, which was about in the middle of the organ, had encouraged the development of a cardiac pouch. As is shown in the radiograph, taken in the recumbent position, the mass is lower than the normal location of the lower border of the stomach. The stomach wound was closed with chromic gut sutures, and the slack of the stomach wall taken up about two inches by making a longitudinal fold, approximating two surfaces about an inch broad. The patient was kept on nutrient enemata for five days, being allowed a small amount of water by mouth from the first. At the end of five days he was permitted fluid diet, and two weeks after the operation full diet. He was discharged from the hospital cured at the end of three weeks.

An examination of the material removed from the stomach showed that the pearl and bone handles had been digested from the knives. There were a few particles of food and considerable mucus mixed with these things. The patient recognized one knife that he had swallowed five months before. The button-hook had been swallowed ten months before. It is evident that during the past year the stomach always contained some metallic foreign

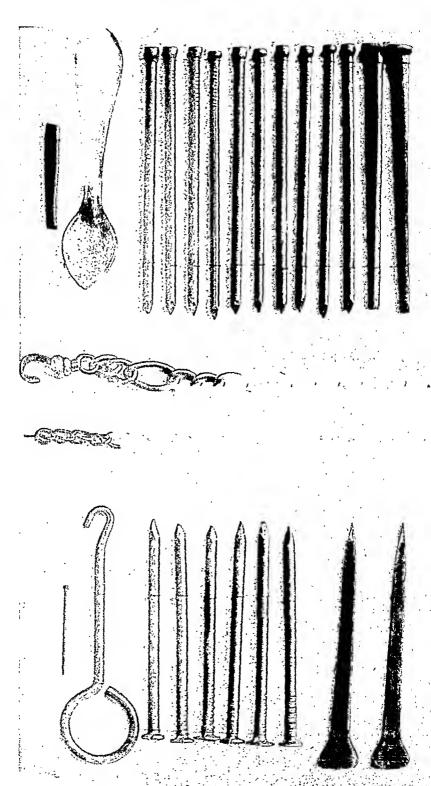
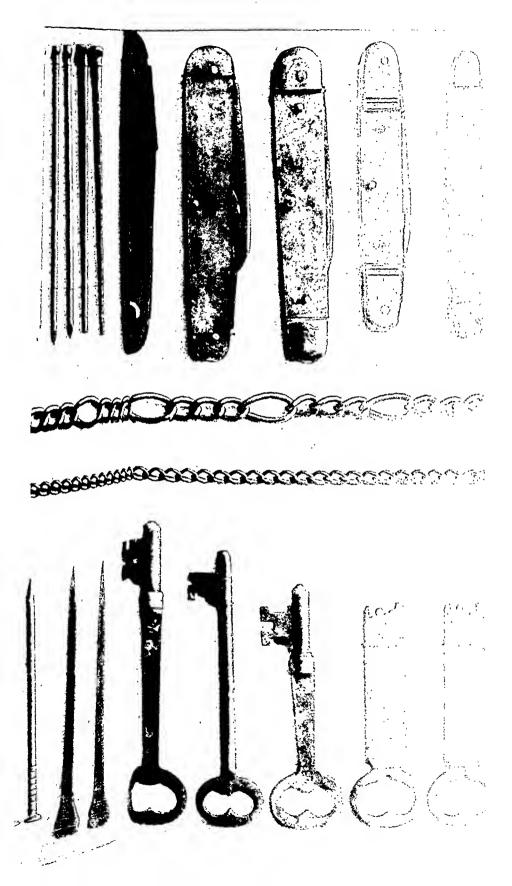
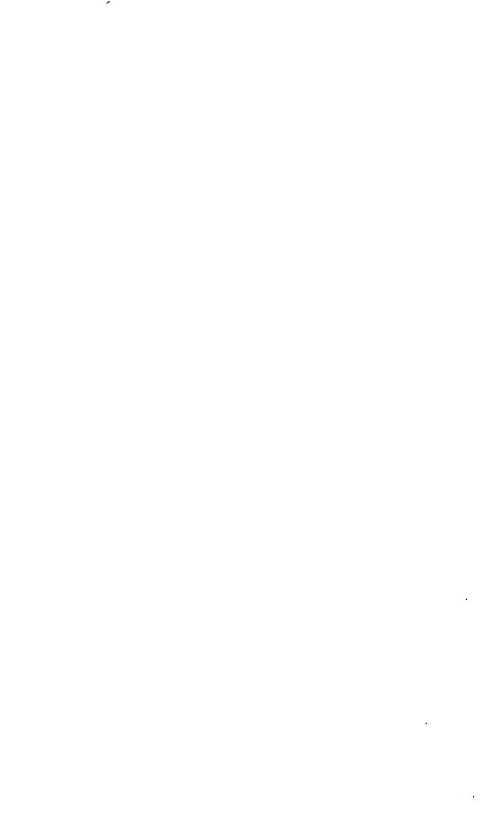


Fig. 2.—Forty metallic articles, weighing one pound, removed from stomach of J. F. at the German Hospital, Brooklyn, New York, May 3, 1904. Pearl and bone handles digested from knives. Operation by Dr. J. P. Warbasse.





bodies. Articles remained in the stomach until they became disentangled and then passed on.

The copper parts of the knives were not bright, but dull in appearance, and there were no gross evidences of the presence of the chloride of copper. Nor did the patient present any symptoms of poisoning from copper salts. His appetite was always good.

The symptoms of tetany in this case were not recognized until after the operation, when a history of his recent attacks was obtained, and the facts concerning previous attacks inquired into. The symptoms described by Trousseau, Chevostock, Erb, and Hoffmann were not elicited. This man, as was the case with the patient reported by Dr. Cunningham, had repeatedly fallen in tetanic convulsions, and been in three different hospitals, and the disease failed of recognition. The peculiar and dramatic interest attracted by his other condition undoubtedly turned attention from the more important and interesting tetanic feature of the case.

The cause of this man's symptoms cannot be found in pyloric stenosis. What moderate dilatation he had was due to the dragging down by the weight of foreign matter, and to the efforts of the stomach to empty itself of a mass that could not pass through the pylorus. As a matter of fact, a normal pylorus may be the cause of dilatation of the stomach if it is not large enough to accommodate the contents which the stomach is trying to extrude. As far as the effect on the stomach wall goes, it amounts to the same thing as stenosis of the pylorus. As to fermentation of food particles among the foreign bodies, it would seem probable that enough of the chlorides of iron and copper would be evolved to inhibit this. It seems to me that this case speaks for the mechanical theory of the etiology of gastric tetany.

INTRA-ABDOMINAL TORSION OF THE ENTIRE GREAT OMENTUM.

BY CHARLES L. SCUDDER, M.D.,

OF BOSTON, MASS.,

Surgeon to the Massachusetts General Hospital.

H. W.; man; aged twenty-five years; occupation, shoeshop employee; entered the Massachusetts General Hospital July 7, 1904. He had been taken ill seven days previously with abdominal pain and vomiting. The pain was general over the abdomen, but gradually became localized in the right side. The bowels did not move for three days. He did not vomit after the first day. He came to the hospital "because the belly was getting filled up."

Upon examination, it was found that the heart and lungs were normal; the abdomen was full. There was no hernia. The left side of the abdomen was comparatively soft. There was no general muscular rigidity. Upon the right side of the abdomen was felt a mass occupying the whole of the right iliac fossa and extending to the right hypochondrium and to the middle line. This mass was protected by muscular spasm. The mass was rather indefinite in outline. It was dull to percussion. It was not movable. It was not markedly tender. There was slight tenderness upon the right side upon rectal examination.

Operation eight days after the initial symptoms. A right semilunar incision revealed a slightly adherent omentum. The finger palpated a friable, dark, rough omentum with some old free blood in its meshes. The vessels of the omentum were thrombosed. The omentum was followed down into the pelvis, separated from the side of the rectum and the wall of the pelvis, and freed from the peritoneum over the iliac vessels and upward to the transverse colon. The bowel lying beneath the omentum was in every way normal. The transverse colon showed no abnormal appearances. In the right hypochondrium was a mass the size of a large orange. This mass, continuous with the omentum, was extremely firm, and proved to be the tightly twisted portion





of the great omentum lying close to the transverse colon. The omentum was twisted several times upon itself. The condition of the omentum as seen at the operation is well shown by Mr. Aitken in the accompanying illustration. The whole great omentum was tied off with silk in sections, just below the transverse colon, through normal omental tissue. The omentum was extremely friable and roughly granular. The appendix was discovered beneath the omentum, and, being somewhat ædematous, was tied off with silk, removed by the actual cautery, and buried with a purse-string suture. The abdominal wound was closed with through-and-through silkworm-gut sutures. The man made an uninterrupted recovery, and left the hospital nineteen days after entrance, apparently well.

The pathologist, Dr. W. H. Wright, reports that the appendix, six centimetres in length, was thickened, the peritoneum injected and roughened in places, showing dense, fibrous adhesions; the walls of the appendix were much thickened and ædematous, The lumen of the appendix contained considerable mucopurulent material. Diagnosis, a subacute appendicitis.

As regards the omental specimen, it consists of a mass of soft tissue, and presents the appearances of a great omentum in which the fat is abnormally large in amount. The specimen is twisted upon itself, probably one and one-third times. There is no fibrinous exudate or inflammatory tissue in and about the twisted portion. The blood-vessels of the specimen are generally filled with blood, and the whole tissue has a reddish color, as from congestion. There is no gangrene.

Before operation, this was thought to be simply a case of appendicitis, although not particularly characteristic of the onset of an attack, and the mass felt was supposed to be adherent omentum over an inflammatory area. The operation revealed an unusual condition. The ligatures below the transverse colon were placed fairly near together, as many large vessels required tying. In the removal of any portion of the omentum, as in large herniæ, it is wise to include a rather small amount of omental tissue in the ligature in order to insure absolute hæmostasis. The ligatures in this case were placed in sound omental tissue close to the transverse colon.

Torsion of the whole large omentum is extremely rare. Certain cases of torsion of parts of the omentum have been recorded. Almost all of these have been associated with hernia. Two instances of omental torsion unassociated with hernia are the cases of Noble (American Journal of Obstetrics, 1904, Vol. xlix) and of Eitel (New York Medical Record, May 20, 1899).

Noble's case was that of a woman, twenty-four years old, unmarried, who was thought to have an acute appendicitis. Operation was suggested and refused. Six days later, being no better, an abdominal incision discovered a normal appendix and a twisted process of omentum attached to the fimbriæ of the right Fallopian tube. Coagulation necrosis was complete in this portion of the omentum. The twisted process was removed. Recovery was complete.

Eitel's case was that of a heavy man, forty-four years old, with ascites. After tapping the abdomen twice and withdrawing several gallons of fluid, an abdominal incision discovered a twisted great omentum with greatly distended veins. The torsion was corrected by untwisting, and the omentum was spread out over the intestines in normal relation. No untoward symptoms appeared. The patient recovered.

I have carefully examined the literature of all reported instances of omental torsion, and in every case an abdominal hernia existed, excepting in these two cases and in the case reported for the first time in this paper.

Etiologically, these cases of torsion of the omentum are of interest. They may be arranged in four groups. First, those in which the omentum is found twisted and adherent in a hernial sac. Second, those in which the omentum lies twisted near to an empty hernial sac, the twisted omentum evidently having once occupied the sac. Third, those in which a hernia exists, and the twisted omentum is attached to some organ, but not apparently connected with the hernia. Fourth, those in which no hernia exists at all. It has generally been supposed that two points of more or less fixed attachment are necessary, around which fixed points the omentum is

rotated or swung until, by the passive congestion and coagulation necrosis, the twisted parts of the omentum become agglutinated, and the whole mass slightly adherent to neighboring organs.

Taxis has been assigned by Hochenegg as a cause of torsion of the omentum,

Martinaud regards the presence of a hernia in many of the cases as purely incidental, and not causative of the torsion Payr (Archiv für klinische Chirurgie, 1902, in any sense. Band lxviii, S. 501) has experimentally produced torsion of the omentum in animals. He formed gas cysts in the omentum by inserting metallic magnesium into the omental tissue. This splits the H₂O of the tissues to form MgO₂ + H; the MgO₂ is absorbed, leaving cysts filled with H gas. These cysts are usually multilocular, the largest being about four to five centimetres in diameter. Omental torsion was caused because of the presence of these cysts in the omentum. He tried introducing material into the omentum which had less specific gravity than the abdominal organs generally, but which did not exert any upward force as the light gas cysts did. tried cork, wood, paraffin, and alder pith. He obtained torsion of the omentum with all these. He tried implantation into the omentum of a piece of liver, but no torsion resulted, because adhesions formed. Payr thinks that, because the veins are longer and more tortuous than the arteries, when the veins are compressed by a kink of some kind, that they become turgid and full of blood. The arteries form a tense elastic cord. The congested omentum turns about this cord. and once started the twisting continues. He compares a distended appendix to the conditions described above, in which case the mesentery represents the tense cord. In conclusion. Payr writes:

It is important to distinguish between internal and external causes of torsion. Internal being brought about by conditions of growth and circulation. The conditions of growth of a tumor and the variations in weight thus caused play an important rôle in the etiology of torsion. The blood-vessels

play an important part in the etiology as suggested above. Payr demonstrated that omental torsion may be caused experimentally in the absence of hernia or adhesions, and these three cases of Noble, Eitel, and my own here reported confirm clinically the results of Payr's experimental work.

The appended references to literature contain the most important papers published.

REFERENCES.

Baracz. Deutsche Zeitschrift für Chirurgie, February, 1900, liv, p. 584. Bayer. Centralblatt für Chirurgie, 1898, p. 462.

Eiselsberg. Beiträge zur deutschen med. Wochenschrift, 1898, S. 260.

Eitel, G. G. New York Medical Record, May 20, 1899.

Hochenegg. Wiener klin. Wochenschrift, March 29, 1900, p. 291.

Noble, T. B. American Journal of Obstetrics, 1904, Vol. xlix.

Nordman. Centralblatt für Chirurgie, 1903, S. 206; Deutsche med. Wochenschrift, 1903, No. 28, p. 499.

Oberst. Centralblatt für Chirurgie, 1882, No. 17.

Peck. New York Medical Record, March 3, 1900.

Rudolf. Wiener klin. Rundschau, 1903, Nos. 44-47.

Schnitzler. Wiener klin. Rundschau, 1896.

Wiener. Annals of Surgery, 1900, Vol. xxxii.

HERNIA OF THE BLADDER COMPLICATING INGUINAL HERNIA.¹

BY FRANCIS J. SHEPHERD, M.D., C.M.,

OF MONTREAL,

Senior Surgeon to the Montreal General Hospital.

THE fact that in one per cent. of cases of inguinal hernia there is an accompanying hernia of the bladder, endows this subject with great interest, and warns the surgeon to be careful lest he accidentally wound the bladder whilst operating for the radical cure of hernia. Wounds of the bladder in this operation are not so very uncommon,—more common, indeed, than the number of published cases would lead one to believe. Naturally one hesitates to publish one's failures, especially if they have a fatal issue. Now the protruding portion of the bladder is normally very thin, much resembles a hernial sac, and can without much difficulty be included in the ligature of the sac; again, it may be covered with fat which resembles subperitoneal tissue, and it may thus be wounded in the dissection of this from the supposed hernial sac.

Not a few cases of wound of the bladder are produced by the needle in closing the hernial opening.

Many of these accidents are not recognized until either bloody urine is passed or the bad condition of the patient induces the surgeon to open up the wound and look for the cause. Again, urine may escape from the wound, especially if the bladder has been injured extraperitoneally. If the leakage occurs into the peritoneum, then, of course, a fatal result is almost certain. Occasionally the protruding portion of the bladder is a mere diverticulum, and so thin that it has been punctured for a cyst. In such cases tying off the protruding portion has been successful in some instances. Of course it was

Read before the Canadian Medical Association, August 23, 1904.

not recognized at the time that the cyst was a diverticulum and that the bladder was wounded.

Dr. Farquhar Curtis (Annals of Surgery, Vol. xxi, 1895) has written a most interesting article on "Bladder Wounds in Operations for Hernia." He collected forty-one cases in which there was a mortality of 25 per cent. In twelve out of eighteen cases sutured, primary union was obtained. In many of the cases in which a leakage of urine occurred after operation, the sinus closed spontaneously in from a few days to four months.

Many of these cases occurred prior to the introduction of antiseptic surgery, so it would not be fair to draw too many conclusions from them as to the fatality of bladder wounds. The danger chiefly lies in the tying-off of the sac with the thinned bladder and returning the stump to the abdominal cavity, where, after a short time, there may be an escape of urine into the peritoneal cavity. Many of these fatal cases are not reported. I know of at least two. When it is recognized that the bladder is wounded, prompt closure with a couple of rows of suture will usually result satisfactorily, and the placing of a small drain for a day or two down to the sutured bladder will, if there be leakage, prevent any serious consequences. Curtis mentions cases where, even when the protruding portion of the bladder was tied off, the wound healed without a sinus. It is not necessary to keep a catheter in the bladder after operation.

Jaboulay and Villard (*Lyon Médicale*, 1895) report three cases of hernia of the bladder where in two cases the bladder was wounded and one died. In one case the whole bladder with the prostate was herniated.

The commonest form of hernia of the bladder is the extraperitoneal, where the bladder protrudes towards the lower and inner part of the sac,—the posterior and inner wall of the bladder forming the lower and anterior wall of the sac containing the bowel. In most cases the sac containing the bowel protrudes beyond the bladder, but its lower wall is continuous with the peritoneum covering the posterior wall of the bladder.

The bladder may be within the sac altogether, the intraperitoneal portion alone protruding, or there may be a hernia of both intra- and extraperitoneal portions. In all my cases it was evidently the extraperitoneal portion of the bladder which protruded, and the lower wall of the hernial sac was bounded by the bladder, the peritoneum forming this part of the sac being closely attached to the bladder and pulling that organ down with it as it protruded. In only one of the cases could any history be got connecting the hernia with the bladder.

Case I.—E. T., aged fifty years, consulted me for a hernia from which he had suffered for some years, and for which he had never worn a truss. Whilst in the Northwest, he had, when lifting, felt something give way in the right groin, and he afterwards noticed a lump there; this lump on lying down disappeared. For the last year or two the swelling had become greater, and at times he has been seized with severe paroxysms of pain; has never had any difficulty in micturition.

On examination I found an inguinal hernia with a very large opening, through which the hernia could be reduced, leaving, however, a thickening supposed to be a sac. I ordered a truss for him, which he wore comfortably for some time, but of late, he tells me, the truss was quite inefficient and the cause of considerable pain. He could rarely reduce the tumor completely, and when reduced the truss would not hold it in place. Besides, he complained of much pain in the tumor, especially when wearing the truss, and demanded operation. This was agreed to, and he was admitted as a private patient into the Montreal General Hospital, November 22, 1901.

Operation.—On November 23, 1901, after the usual preparations, the patient was etherized and the usual incision made for the radical cure. The tumor was quickly come upon, and it was seen that the cord was to the outer side and not attached to the tumor, as is usually the case. The opening through which the sac protruded was very large, and there appeared to be no distinct neck to the sac. This sac was thin above, and through it could be seen the intestines, but below it appeared to be covered with fat, or rather a mass of fat surrounded the anterior part of the sac, which seemed to go towards the pubis. Not wishing to cut this off without knowing what it was, I began carefully to dissect it away.

I found this fatty tissue very granular, vascular, and difficult to separate; suddenly I opened into a smooth cavity, from which escaped an amber-colored fluid. I then immediately recognized that I had to deal with an opened bladder. The rent was several inches long, and the bladder beneath had much the appearance of a hernial sac, so thin was it.

Rather startled by this accident, I at once knew I had to deal with a hernia of the bladder. The rent was sewn up with a double row of Lembert sutures; the upper part of the sac when opened showed its anterior wall to be the outer and posterior wall of the bladder. The large opening, after transplanting the cord, was closed with chromicized-gut sutures, a space being left for a drainage-tube in case there should be a leak from the sutured bladder. A small, soft rubber catheter was placed in the bladder and left there for two days, to act as a drain and prevent tension in the sutured bladder.

The patient recovered well from the operation; had no temperature or pain; the tube was removed on the second day, and also the catheter, and from that time his recovery was uninterrupted. At present he is well, and there has been no return of the hernia. I have questioned him since carefully, and he tells me he has never had any trouble with his bladder, nor had he ever noticed any diminution of the size of the tumor after micturition; in fact, he had never the slightest trouble with his bladder, nor did he ever connect the bladder with the tumor.

CASE II.—Right Inguinal Hernia with Hernia of Bladder, recognized before Ligating the Sac.

M. L., aged forty years, has been suffering for some years from a rupture on the right side; he thinks it came from a strain received several years ago. The hernia could not be satisfactorily controlled by a truss, and he was sent to the Montreal General Hospital for operation.

On admission, January 15, 1902, it was found that he was suffering from a right inguinal hernia which could not be completely reduced. The opening was out of proportion to the size of the hernia. He had never noticed any connection between the size of the tumor and micturition.

Operation, January 16, 1902.—The usual incision for Bassini's operation was made, the external ring exposed, the aponeurosis of the external abdominal oblique slit up, and the sac ex-

posed. The first thing that was noticed was that the cord was to the outer side of the sac, and was not involved in it; indeed, it was quite apart from it. This condition, being the same as in Case I, excited my suspicions, and I carefully examined the sac and found that it could not readily be separated anteriorly and internally; that, in fact, it spread itself towards the pubis so that no distinct neck could be found. The upper and posterior part of the sac was freed and opened, and then it was found that the anterior wall of the sac was the posterior wall of the bladder, and the part internal and anterior was a very thin part of protruded bladder; this was proved by the introduction of a sound and making it enter the lower part of the sac outside the oblique muscle. The posterior part of the sac was ligated and the anterior returned, the cord transplanted and the opening closed, as usual, with chromicized-gut sutures.

The patient's recovery was normal and uneventful, and I have since heard that the result has been most satisfactory.

CASE III.—Right Inguinal Hernia with Hernia of Bladder; Sac Bilobate.

J. C., aged fifty-four years, was admitted into the Montreal General Hospital, April 5, 1902, complaining of a swelling in the right inguinal region.

The patient, who is rather an undersized, poorly developed man, says he has not felt well for some years. About seven years ago he noticed that after lifting a heavy weight a swelling appeared in the right inguinal region. This swelling disappeared on lying down, and reappeared on exerting himself in any way when in the erect position. It gradually became larger, and its appearance was accompanied by a dragging sensation. He noticed that after micturition the size of the tumor somewhat diminished, but never entirely disappeared, except when in the recumbent position. He had worn several trusses, but none were satisfactory, all causing pain. Many years ago he had a bubo in the right groin, which was incised, and there is a large scar in that region.

On examination, and getting him to cough whilst standing, a considerable tumor appears in the right inguinal region. the opening through which it comes being very large.

Operation, April 11, 1902.—The usual incision having been made, the sac was exposed. After splitting up the external oblique muscle, a very large opening was seen, through which a mass

protruded the size of a small orange. The cord was behind the sac, but quite separate from it, and could be easily held out of the way. The sac when carefully examined was found to consist of two parts, separated by a groove, viz., an upper and outer and lower and inner; the upper sac was very thin, and through it the intestines could be seen moving; the lower sac was thicker and firmer and covered with a lot of vascular granular fat, and the sac ran towards the pubis.

From my experience of the above two related cases, I at once recognized that the lower sac was the bladder; this was proved by the introduction of a sound which, with some manipulation, was induced to enter the diverticulum protruding through the abdominal walls. A careful attempt was made to separate the two sacs, and when this was partially accomplished the upper sac was tied off and the whole hernia reduced. After transplanting the cord, the opening was closed in the usual way in Bassini's operation with chromicized gut.

The patient's recovery was uneventful, and he was discharged three weeks after operation. I have seen him quite recently (February, 1904), and he tells me he is perfectly well, and there has been no return of the hernia.

Case IV.—Right Direct Inquinal Hernia with Hernia of the Bladder and Hydrocele of the Sac; Wound of the Muscular Coat of the Bladder.

A. W., aged thirty-eight years, entered the Montreal General Hospital, April 15, 1903, for the radical cure of hernia in the right inguinal region. He has also a fluctuating swelling which descends to the scrotum. The patient, whilst lifting a heavy weight some twelve years ago, felt something give way in his right groin, and noticed a swelling in that region. This easily went back; and he consulted a doctor, who gave him a truss, which he wore for a year, and then gave up because he thought himself cured, but since then every two or three weeks the tumor would reappear. He easily put it back, and thus on some occasions it would not return for a month. Latterly, although he could reduce the tumor easily, it would come back immediately, but never caused him any trouble until the day before he entered the hospital, when he was unable to reduce it. Has never had much pain; never could pass water whilst lying down; but the bladder was easily emptied while standing. Has always been healthy and has worked hard.

On examining the patient, a large, tense, smooth tumor, oval in shape, the size of one's closed fist, seen in the right inguinal region and extending into the scrotum; the tumor is dull on percussion. The testicle is below and external to the tumor and quite separate from it. The tumor could not be reduced, but is not tender.

Operation.—An incision about four inches long was made over the tumor, extending into the scrotum; the tumor was separated from the surrounding tissues, and it was noticed that the cord was not blended with it, but was to the inside and quite separate. The sac seemed to be lobulated and to contain fluid below and omentum above; the latter could be seen moving on the sac with respiration.

As complication with the bladder was suspected, the sac was carefully opened over the contained omentum, and then it was found that there was a collection of fluid in a sac in front. On passing a sound into the bladder, it was seen that the inner and anterior wall of the sac was formed of that organ. The omentum, which was partly adherent, was tied off and cut away, and then the sac was carefully dissected from the protruding bladder. In this dissection the muscular coat of the bladder was wounded, but the bladder was not opened. After suturing the wounded bladder, the sac was tied off and the bladder reduced. The usual Bassini operation was performed and the wound closed with four chromicized-gut sutures, care being taken not to injure the bladder in passing the sutures. On careful examination the hernia seemed to be direct.

The patient recovered rapidly and had no drawbacks during convalescence; he could quite easily micturate now whilst lying down. He was discharged twenty-two days after operation quite well, and there has since been no return of his hernia.

This case was much complicated by the fact that there was a sac of fluid in front of the tumor, not communicating either with the hernial sac proper or with the bladder.

It is most important to recognize hernia of the bladder when operating for the radical cure of hernia, and there are certain points to which my attention has been directed in the cases I have met with which would enable one to avoid mistakes. First, the inguinal opening is always large, out of proportion to the size of the protruding intestines. Second, the cord is not intimately associated with the sac of the tumor, but can be readily held aside without dissection; it is usually to the outer side of the tumor. Third, in two at least of my cases the hernia was a direct one, and in all had been produced by a sudden strain. Fourth, the difficulty of finding a neck to the sac, for the anterior portion of the sac stretches away towards the pubis, and is perhaps covered with granular and very vascular fat. In my fourth case the condition was complicated by the presence of a collection of fluid in front of the sac, which extended into the scrotum.

Having once wounded the bladder, as I did in my first case, the surgeon is always on the lookout for this complication, and readily recognizes it.

DERMOID CYST OF THE PELVIC CONNECTIVE TISSUE.

TWO CASES, WITH A CONSIDERATION OF TWENTY-FOUR REPORTED CASES.

BY HARRY H. GERMAIN, M.D.,

OF BOSTON, MASS.,

Instructor in Surgery and Anatomy in Tufts Medical School; Out-Patient Surgeon to Carney Hospital.

THROUGH the courtesy of Drs. Munro and Bottomley, of the Carney Hospital, I have had the opportunity of observing two cases of dermoid cyst of the pelvic connective tissue, which I report because of their rarity and importance.

CASE I .- H. B.; aged thirty-five years; married; housewife; has always lived in Massachusetts. Catamenia at eighteen. No pain. Apt to be irregular. Four children. Three miscarriages. Has not been well for ten years. Is easily tired, and not at all strong physically. Eight years ago, during one of her pregnancies, the attending physician discovered a tumor in the pelvis. Patient never paid any attention to this on account of lack of symptoms. Constipated for years and liabitually takes laxatives. No appetite. No urinary symptoms.

Physical Examination.—Well developed and nourished. Pale. Head, neck, and chest negative. Abdomen,-no spasm. distention, or evidence of free fluid. Some tenderness, with an indefinite mass in lower left quadrant. Fluctuant tumor posterior to rectum and pushing the latter far forward. The upper edge of the tumor is beyond the reach of the finger and is felt obscurely over the pubes. Uterus displaced upward, is Y-shaped, either from fibroids or bicornate.

Operation by Dr. J. C. Munro. Oblique incision made along left edge of sacrum and coccyx. The latter was removed. retrorectal space a multilocular cyst size of two fists was found. On separating tumor from the sacrum, the anterior wall of the latter showed a broad groove ending at the level of the third segment in a canal, half an inch in diameter and of indefinite length. From the anterior lip of this canal there was a firm band

of tissue connected with the cyst, which had to be severed. So far as could be seen, there was no direct communication between the cyst and the spinal canal. Laterally, the attachment of the cyst was firm and had to be tied and cut. Anteriorly, attachment to the rectum was not firm. The main cyst ruptured in dissection, giving escape to a thin fluid. Apparently all the cyst wall was removed, leaving a large cavity. Wound was partly closed with silkworm gut. Iodoform gauze drainage.

The further history is not remarkable. Patient made an uninterrupted recovery and has had no further trouble.

Pathological diagnosis is a dermoid cyst with a connectivetissue wall. The latter contains nerve-fibres.

CASE II.—W. C.; female; single; aged eighteen years. About six months ago noticed tumor in abdomen. This has gradually increased in size, and is at times tender and painful. No other symptoms.

Physical Examination.—Well developed and nourished. Heart and lungs negative. Immobile tumor in median line in hypogastric region. Extends into left iliac region and is composed of two nodules. The upper and larger mass is the size of a grape fruit, while the smaller and lower mass is the size of an orange. Both tumors are adherent to each other and to Poupart's ligament. Tumors feel like tense cysts, though there is no definite fluctuation. Diagnosis of adherent ovarian cyst was made.

Operation by Dr. J. T. Bottomley. Incision four inches long in the median line below the umbilicus. The peritoneal cavity was opened and a large fluctuant tumor presented. It was situated in the upper half of the pelvis, and the pelvic organs were markedly displaced to the right. The iliac vessels ran over the sac wall, and were so displaced forward that they lay just beneath the anterior abdominal wall. The peritoneum was incised, and with the iliac vessels was pushed to the right. The tumor was then tapped and a considerable quantity of light yellowish fluid containing hair and some curdy detritus escaped. An attempt was now made to excise the sac, which was adherent everywhere, but particularly adherent to the sacrum. It apparently followed the vessels beneath Poupart's. The patient did not stand the operation well, and her condition finally became so serious that work was stopped. The general peritoneal cavity was packed

off and the cyst filled with gauze packing. The cyst wall was now sewed to the anterior abdominal parietes. Abdominal wound partly closed. Sterile dressing. On the day following patient showed signs of hæmorrhage—pallor, rapid pulse, sighing respiration, etc. Ether was given and the abdominal wound was reopened. The pelvis was found filled with dark, fluid blood. No evidence of fresh bleeding. Gauze packing. On the second day there was still some oozing of dark blood, so the pelvis was again packed with gauze soaked with adrenalin 1–2000. Salt solution was given with stimulants. No subsequent bleeding occurred, but the patient grew worse, and died on the afternoon of the second day.

Pathological diagnosis was dermoid cyst. Wall was composed of dense connective tissue.

From a study of the cases in the literature, with the two new ones of my own, making twenty-five in all, a good idea of the clinical aspect of these tumors can be obtained. I have selected only those cases where the diagnosis is confirmed either by operation or autopsy.

These tumors are always subperitoneal, and most frequently lie above the levator ani muscle (eighteen cases in twenty-five). In eleven cases the tumor was retrorectal and on the left side; once only on the right (Sanger). Three times (Biernacki, Page, and Germain, Case I) the tumor was clearly median. Three times (Emmet and Mannel, two cases) the cyst was anterior in Douglas's cul-de-sac. In Schultze's case there was one cyst above, the other below the levator ani. The same condition existed in Hofer's patient. but here the upper cyst lay between the layers of the broad Marchand has reported a microscopic dermoid found at autopsy between the layers of the broad ligament (cited by Hofer). In a case described by Weinlechner there was in all probability two parts to the tumor.—one above, the other below the levator; but the description is not clear enough to determine this point. A similar condition probably existed in Walzberg's patient. The tumors described by Birket and Kuster lay below the levator between the anus and coccyx.

Gussenbauer (*Präger med. Wochenschrift*, 1893, No. 36) found accessory cysts placed laterally in addition to one in the median line.

I have been unable to find a case where the cyst was situated in the ischiorectal fossa. It is best to exclude the superficial anococcygeal dermoids from this classification, since they give rise to no pelvic symptoms.

The size of these tumors varies from the microscopic finding of Marchand to the enormous growth of Ord, which nearly filled the abdominal cavity. These are, of course, extremes, and as a rule these cysts vary from the size of a hen's egg to that of a child's head.

In shape these growths are round or oval, but may be irregular as they lie in the pelvis. For the most part they are soft and fluctuant, filled with fluid which microscopically shows fat, cholesterin, and cellular débris. Hair was found in the tumors described by Trzebicky, Biernacki, Page, and Germain (Case II), and bone in Walzberg's case. Bland Sutton ("Tumors Innocent and Malignant," 1903) states that teeth may be found in dermoids in this situation, but I have been unable to confirm this observation.

The cyst wall usually consists of connective tissue lined with epithelium, representing more or less completely the structure of the skin. The stratum corneum and the stratum Malphighii can sometimes be recognized. In Hofer's case the papillary layer of the corium was not present, but in those of De Quervain and Trzebicky this layer was easily demonstrated. De Quervain was also able to demonstrate smooth muscle-fibre in the cyst wall, while nerve tissue was found in one of my cases.

The ages of the patients in this series varied from eighteen to fifty-eight years. In four cases the age is not given. Two occurred between ten and twenty. Ten between twenty and thirty. Six between thirty and forty. Two between forty and fifty, and one between fifty and sixty.

Nineteen of the twenty-five cases occurred in women in the child-bearing period of life, the sex being feminine in

twenty-three of the twenty-five cases. In regard to sex, the dermoids are like the more complicated teratomata of this region, which are much more frequent in females. The teratomata are, however, usually congenital as distinguished from the dermoids which appear later in life. This is, of course, a clinical distinction, due to the fact that the dermoids, though congenital, take on growth and give rise to symptoms in adult life. On the other hand, teratomata occur very frequently in dead-born fœtuses or infants dying at an early age. In Calbet's collection of 117 cases, fifty were dead-born or died during the first days of life (Thèse de Paris, 1893). Twenty-nine out of eighty-one of Molk's cases were dead-born (Thèse de Strassbourg, 1868). Follin and Duplay reported seventy cases, sixty-one of which were still-born or died in the first month of life.

As might be expected, the dermoid cysts displace the pelvic organs more or less, the amount of displacement depending on the size and situation of the tumor. The rectum and vagina are described as being flattened, while the bladder and interus are elevated, as a rule. In Deahna's case the bladder and urethra became gangrenous from pressure.

No definite clinical symptoms appear in these cases. The cysts may remain quiescent for years and give rise to no trouble or discomfort. The symptoms which appear may be divided under two heads, (1) Mechanical. The tumor simply by its presence may be an obstruction to labor. This was observed by von Biernacki, Page, and Sanger. In a similar way retention of urine and intestinal obstruction are caused. Retention is mentioned by Luksch, Dealma, and De Quervain. while obstruction occurred only in Dealma's patient. Lesser degrees of obstruction are more frequently mentioned, and we often meet with the expression "difficulty in urination and defecation." Krogius and Luksch mention cedema of the feet and legs, and Colonna observed mucus and blood in the stools. These symptoms can be attributed to obstruction to circulation, and it is possible that menstrual disturbances and dysmenorrhœa are due to this cause.

(2) Under the second heading, the symptoms are due to microbic infection of the cyst. We then have a rapid enlargement of the cyst and retention of urine, and intestinal obstruction results, with the addition of symptoms of infection,—rise of temperature, nausea, etc. This was well illustrated in Deahna's patient, and to a lesser degree in Emmet's case. It is worthy of note that in none of the reported cases did the tumor cause sciatica or obstruct the ureter.

I have avoided reference to rectal, vesical, uterine, and ovarian dermoids, though there is little doubt that some of the so-called rectal and uterine dermoids were primarily cysts of the pelvic connective tissue. Examples of these are reported by Danzel (Archiv für klin. Chirurg., Band xvii, S. 442), Snyers (Méd. et Pharm., ii, 372, Paris), Gelstrom (Central. für Gynäk.), and others where dermoids ruptured into the rectum or vagina during labor. These, of course, might have been ovarian, but it is more likely that they were primarily situated in the pelvic connective tissue. Vesical dermoids may be ovarian in origin, becoming adherent, and finally rupturing into the bladder, or they may be primary in the bladder, as in a case reported by Martini (Archiv für klin. Chirurg., Band xvii, S. 449). Clinically, dermoids of the bladder give rise to a distinct symptom complex, so they are simply mentioned here.

Formerly, these cysts were all supposed to be ovarian in origin till Sanger pointed out that the ovaries were intact. Further, the cases of Ord and De Quervain occurring in men refutes this idea. The later theories refer the origin to the fœtal period of life. Embryologically, these cysts contain tissues derived from one or two germ layers, ecto- and mesoderm. It is supposed that during development, bits of ecto- and mesoderm are misplaced, remain quiescent for a period of time, and finally give rise to cysts of more or less complicated structure. This theory finds support in experimental work in animals. In the development of the lower end of the body, all the germ layers are in intimate relation, and the misplacement of bits of the outer and middle layers may take place

during the formation of the spinal cord, when the proctodæum invaginates to meet the neurenteric canal, or during the development of the genito-urinary apparatus. The old theories referring the origin of these tumors to Luschka's gland and to remnants of the postanal gut are no longer seriously considered. The more complicated teratoid tumors derived from all three germ layers may be fœtal inclusions, that is bigerminal, or, according to some authors, they are derived from a fertilized polar body or a segmentation sphere displaced very early in embryonic life. This has given rise to much discussion, but it need not concern us here.

Apparently the dermoids and teratomata of this region show no tendency to malignancy, as I have found no reported cases.

In diagnosis, it is of prime importance to determine the immobility of the tumor. If the growth is movable, it is not a tumor of the pelvic connective tissue. Tumors in Douglas's cul-de-sac cannot be differentiated without operation, since here we may have an adherent ovarian cyst, fibroid of the uterus, etc. A fluctuant retrorectal tumor may be an abscess, serous cyst, echinococcus, or a dermoid cyst. One can only differentiate by tapping. The presence of hair in the urine or fæces is strongly suggestive of a dermoid of the pelvic tissue, but may mean an adherent ovarian cyst. The same may be said of hair appearing in considerable amount during labor or in the lochia. Prognosis must depend entirely on the individual case.

Treatment.—Radical excision of the whole sac wall is the only rational procedure where it is possible. This may be difficult or impossible owing to dense fibrous adhesions, and always is the case if there has been suppuration. Usually, if we can judge by reports, these cysts have a definite capsule which renders excision easy.

Tapping as a therapeutic measure is to be condemned. In Ord's case, tapping through the abdominal wall resulted in fatal peritonitis. Gangrene of the urethra and base of the bladder ensued from suppuration of the cyst after tapping in

TABLE OF CASES OF DERMOID CYST OF THE PELVIC CONNECTIVE TISSUE.

Author.	Sex, Age, Symptoms.	Size, Situation, and Peculiarities of Tumor.	Treatment.	Remarks.
COLONNA. Gaz. Med. di Torino, 1896, p. 200.	Female; twenty-eight years. One normal confinement. For five months difficulty in evacuating rectum. Feeling of pressure in perineum. Tender in left iliac fossa. Mucns	Four centimetres above anus could be palpated a ball-like tumor pushing rectum forward. Upper limit not made out. Tumor soft and elastic. Uterus pushed up and to right.	Removed by parasacral Recovery, incision.	Recovery, twenty-six days.
DE QUERVAIN. Archiv für klin. Chirurgie, 1898, Band Ivii, Heft 1, S. 129.	and blood in stools. Male; fifty-eight years. Has used a catheter for nineteen years. Retention of urine with false passage. Fæces ribbonlike.	Rectum displaced forward and to the right. Tumor reaches from third sacral vertebrae to within a finger's breadth of the navel. Contents: brown purulent fluid with epithelial debris, fat, and cholesterin crystals. Cyst wall: connective rissue lined with epithelium, ontside of	Incised and drained; after three perineal incisions drainage (extraperitoneal) from abdomen. Three weeks later remains of sac removed through, parasacral in	Recovery, four weeks.
Skutsch. Zeitschrift für, Geburtshülfe und Gynäkologie, 1899, No. 40.	Female; twenty-eight years. Three confinements at term. One abortion. Five months pregnant. Difficulty in urination and defeca-	which is a layer of smooth muscle-fibre. Rectum displaced forward and to right by tumor, which is about size of child's head. Uterus elevated and vagina narrow and pressed forward. Tumor can be readily palpated bimanually. Contents: yellow albuminous fluid, which	cision. Partly excised through Recovery. perineal incisions. Drainage.	Recovery.
Skursch, Zeitschrift für Geburtshüfe und Gynäkologie, 1899, No. 40.	PP	contains fat and cholesterin crystals and peptone. Wall of cyst composed of connective tissue lined with epithelium. Tumor in left half of pelvis reaching nearly to median line. Above reaches to promontory of sacrum, below to perineum. Contents as above, and in addition pseudomucin.	Perineal excision. Drainage.	Drain- Recovery.

	CYST OF	PELVIC	CONNECT	IVE T	ISSUE.	937
A Healing after two months' suppura-tion.	Two months' suppuration. Healing.	Recovery after two months.	This case is doubtful; probably belongs to anococcygeal dermoids.	Recovery.		of the perinenm.
Partial extirpation. A part reaching high into pelvis could not be removed.	Tapped from vagina. After several days, incision to left of anus, with partial extirpation.	Upper part of suc not removed for fear of opening peritoneum. Partially excised, partly destroyed with funing 11MO.	Extirpation, suture.	Laparotomy, excision. (Diagnosis before operation was ovarian cyst.)	Extirpation. Tumor found to consist of two parts not joining one another.	,
Die Female; twenty-six years. Congenital tumor between anus and No symptoms. No symptoms. No symptoms. No symptoms. No symptoms. Less. And Partial extirpation. A part reaching high into to anus was a second tumor, size of an plum. The strippation of the partial extirpation. A part reaching high into to anus was a second tumor, size of an plum. Contents: peasoup-like fluid containing		Two dermoid cysts on anterior surface of coccyx.	Dermoid cyst, size of hen's egg, between anus and coccyx.	twenty-two Dermoid eyst lying between peritoneum Repeated at and levator ani muscle.	€	deluis. Cyst wall lined with payement epithelium.
Female; twenty-six years. No symptoms.	Female; twenty-nine years. One abortion, Irregular menstruation. Nervous symptoms.	Female; thirty-six years. No symptoms.	No symptoms.	Female; years. 1 tacks of p		one-half years.
WALZHERG. Die chirurg. Klinik in Göttingen, Jahresbericht, 1875-8,	EW. Rcf. für Chi- 1884, No.	WHINLECHNER, Cited by Skutsch,	Kustira. Verhandl. No symptoms. der dentschen Ge- rellschaft für Chi- rurgie, 13 Con- gress, 1884, S.	FANET. American Journal of Obster- rics, 1884, p. 852.	Thermone, Wien, 1 med, Wochen, abilit, 1885, No. 13, S. 391, and No. 14, S. 422.	

TABLE OF CASES OF DERMOID CYST OF THE PELVIC CONNECTIVE TISSUE, -Continued.

CYST	OF PELVIC CONNEC	TIVE TIS	SUE. 939
Ten months' suppuration. Plastic closure of urethro- and vesico-vaginal fistulæ.	Rapid contraction and obliteration of cavity. Recovery, remaining complete when examined nine years later.	Recovery after fifty- nine days.	Healing in three weeks.
Tapped from rectum. This was followed by suppuration of cyst, with rapid increase in size and resulting gangrene of urethra and base of bladder. Cyst evacuated by incision between anus and coceyx.	Left parasacral cut; coc. Rapid contraction and cyx excised; osteoplas- obliteration of cavity, tic resection of edge of Recovery, remaining sacrum; enucleation of complete when exgreater part of wall of amined nine years cyst, which was cut later. away, with escape of hair, epithelial debris, and pus. Remnant of sac left behind swabbed with pure carbolic acid.	Tapped from rectum, Recovery after Forceps attempted, followed by craniotomy. Cyst suppurated, Reserved	Tapped from rectum. Nine months later removed by perincal route.
Archiv. Female; eighteen years. Lies on left of pelvis behind rectum, and Fapped from rectum. Ten months' suppuration. 305. Nullipara. Sudden pain reaches above to midway between navel vomiting. Retention of displaced to right. urine. Ten months' suppuration of cyst, of urethro- and vesivomiting gangeren of urethra and base of bladder. Cyst evacuated by incision between anus and coceyx.	Pelvis filled with immovable tumor, displacing rectum to right.	Voy Biller, Ackl. Female; twenty-eight Tumor between rectum and sacrum reach- bles. Bethin, 1887. years. Entered clinic ing to within four centimetres of anus, in labor. Primipara. Contents: purilent fluid containing hair.	Tumor sire of child's head; lay on right Tapped from rectum, side of pelvis. Rectum and vagina displaced to left, uterus displaced upward. Inoved by perineal lies above levator ani. Contents: route. brownish fluid containing epithelial cells, detritus, and cholesterin crystals.
Female; eighteen years. Nullipara. Sudden pain in abdomen, distention, vomiting. Retention of urine.	Male; forty-five years. Symptoms of rectal obstruction and sciatica, followed by pus infection, with pointing through left great sacrosciatic foramen.	Fenale; twenty-eight yeus, Entered clinic in Libor, Primipara.	Very, 1889, Pad Nov confinencity, very, 1889, Pad Nov confinencity, very, 1889, Pad Dang let thee cycle fended in abstration to bear tion
PEAHNA. Archiv. für Gynākol., 1875, Vol. vii, p. 305.	PILCHER, L. S. Melhodist Episco- pal Hospital Re- ports, 1895.	Vos. Bitrakeri. Dise Betin, 1887.	Syote, Arhu fur Cyn, 1800, Pad veru, S. 100

TABLE OF CASES OF DERMOID CYST OF THE PELVIC CONNECTIVE TISSUE.—Concluded.

Remarks.	Recovery in six weeks.	Recovery and normal termination of pregnancy.	Hofer mentions case reported by Marchand. The latter found a small dermoid between the layers of the broad ligament in a child.	Recovery.
Treatment.	Tapped from rectum. Two days later suppuration, with fever, vomiting, etc. Transverse incision behind anns. Cyst diained and sae remoyed.	Tapped from rectum, and after two months removed through incision (perineal).	Diagnosis of dermoid cyst Hofer mentions case confirmed by tapping. Cyst exciscd by perineal and. The latter found a small dermoid between the layers of the broad ligament in a child.	Excised by 1cft colpoperingeconery.
Size, Situation, and Peculiarities of Tumor.	Tumor size of ericket-ball felt below umbilicus (movable). Below and posterior to this is a large elastic tumor reaching nearly to umbilicus. This tumor nearly fills pelvis. Rectum and vagina displaced forward, and latter is pressed against symphysis and much longer than normal.	Female; thirty-three years. Seven confinements; at fourth midwife noted tumor. Last labor difficult. Six weeks pregnant.	Tumor, size of child's head, in left gluteal region. Vagina pushed to the right. Tumor reaches into pelvis between layers of the broad ligament (left). Contents of cyst: yellow fluid in which is pavement epithelium, cholesterin, and detritus.	LENNANDER. Hy- giea, Band lxi, p. Three confinements Uterus displaced up and forward. Left 431. Central. für with artificial aid. Fallopian tube crosses tumor like a chirurgie, 1899, No. 28.
Sex, Age, Symptoms.	Female; forty-seven years. Seven difficult labors. Tunnor noted at fifth confinement twenty years previous; sixth labor, difficult; seventh labor, craniotomy. Difficulty in evacuating bladder and rectum.	Female; thirty-three years. Seven confinements; at fourth midwife noted tumor. Last labor difficult. Six weeks pregnant.	HOFER, Diss, Halle, remale; thirty-seven years. Three confinements. Last confinements. Last confinement one year previous. Tumor noted for six years.	Female; twenty-six years. Three confinements with artificial aid.
Author.	PAGE. British Mcdical Journal, 1891, Vol. i, p. 406.	Scitulize. Deutsche med. Wochen, 1895, No. 22, S. 352.	Hopur. Diss. Halle, 1896.	LENNANDER. Hygiea, Band Ixi, p. 431. Central. für Chirurgie, 1899, No. 28.

CY	SI OF PELVIC	CONNECTIVI	11550
Recovery.	Recovery.	Recovery.	Death from concealed hæmorrhage.
Tumor could not be removed by laparotomy, so parasacral cut was made and coccyx and part of sacrum were removed and cyst excised. Drainage.	Three cysts excised by Recovery. removing coccyx.	Excision,	Abdominal incision (attempted excision). Diainage.
Rectum displaced forward and to right. Tumor could not be relative to pelvis, and can be moved by laparotomy, so parasaeral cut was made and coccyx and part of sacrum were removed and cyst excised. Drainage.	dectum displaced forward and to the left. Uterus displaced upward. Vagina long and narrow. Fistulæ in vagina and perineum. Cysts with dermoid contents.	Fluctuant tumor size of fist behind rectum. Rectum and vagina pushed forward. Uterus displaced upward. Indefinite tender mass in left iliac region.	1914 19 Pottoudey.) Nullipara. extending into pelvis. Mass size of tempted excision), two first immobile.
Kencitts. Archiv. Female; twenty-six years, far klin. Chrur- Repeated attacks of integic, No. Ivi, S. 48. testinal obstruction since a child. Some ædema of feet.	child born dead forceps). In forceps). In retention of urine nary). In July, noticed tumor. in year difficulty feeation and urinative with cedema of n, with cedema of	(5) EMM's, (Opera-) Female; thirty-five years, red by Munro.) Four confinements. Two living children. Three misearriages. Constipation. Loss in weight.	Female; cighteen years, Nullipara.
Knoat s. Archiv. far klin. Chuur-	Г. W. Wechensehr., 1899, S. 249.	Greate, (Operared by Munio.)	tot over the pottomley.)

Deahna's case. In the patients of Page and von Biernacki, suppuration of the cyst caused by tapping necessitated immediate operation. Tapping followed by injection of irritants is mentioned only to be condemned. Incision and drainage can be resorted to where a hasty operation is demanded, as, for example, during labor, when the cyst is an obstruction. As a rule, this is not a satisfactory procedure, as is shown by the reports of von Biernacki and Solowjew, where this operation was followed by two months of suppuration.

The choice of operative measures must depend on the individual case. The lateral perineal incision extended is necessary along the edge of the sacrum, with or without excision of the coccyx gives ample room for any cyst not extending above the pelvic brim. For cysts rising into the abdomen, median laparotomy must be the operation of choice, or combined perineal and abdominal operation may be required. De Quervain was able to loosen the upper attachments of the cysts in his patient by an extraperitoneal operation, but this is exceptional. Page made a transverse incision between the anus and the coccyx, drained the cyst, and was able to remove the sac through this opening. Even after total removal of the sac, drainage is usually advisable on account of dead space.

SUMMARY.

- I. Dermoid cysts of the pelvic connective tissue are of rare occurrence.
- 2. They appear most frequently in women in the childbearing period of life.
- 3. Their most common situation is posterior to the rectum and above the levator ani muscle.
 - 4. They can be cured only by radical surgical interference.
- 5. Their origin is to be referred to the fœtal period of life.

I have appended a table of the reported cases. Some of these were taken from the works of Sanger and De Quervain; others were derived from various sources. All were confirmed except the reports of Mannel and Weinlechner, which I could not obtain in the original.

THE ILIAC EXTRAPERITONEAL OPERATION FOR STONE IN THE LOWER URETER IN THE MALE.

BY HARRY ATWOOD FOWLER, M.D.,

OF WASHINGTON, D. C.

During the absence of Dr. H. H. Young, of Baltimore, on his vacation in the summer of 1903, the following two cases were referred to me, and form the basis of this communication.

CASE I.—Referred by Dr. H. M. Kaufman, of Washington, D. C., to whom I am also indebted for the following history.

D. R., aged thirty-six years; complaint, attacks of passing bloody urine and constant desire to urinate. The family history is negative.

Previous History.—Unusually healthy, except for trouble for which he seeks relief. He has never had an acute illness or any infectious fevers. He denies all venereal infection. are exceptionally good.

Present Illness.—In 1879, at the age of eleven years, he was taken suddenly, in the morning, with a severe pain in the left side, just under the costal margin. The pain was sharp, cutting It lasted only a in character, and well localized in the left loin. short time. There were no urinary symptoms associated with or following this attack. He did notice, however, a sensation of warmth over an area as large as his hand, situated just below the left costal margin in the left mammillary line. This peculiar sensation has persisted up to the present time.

A few months later, without any pain or other nrinary symptoms, he passed a large quantity of blood in the nrine. continued for twenty-four hours, after which the urine became perfectly clear, and there was no disturbance of urination. After this attack of hæmaturia, he was perfectly well for two years.

In 1881, while working on the farm, the hæmaturia again appeared without any warning, persisted for about twenty-four hours, and passed away, leaving no urinary disturbance. For a period of eight years he was again free from any urinary trouble.

In 1889, while travelling, he had a similar attack of hæmaturia, which lasted about the same length of time, and disappeared again completely.

In 1903 he had his fourth attack of hæmaturia, this time lasting seventy hours. It was directly after this attack that he first noticed any vesical symptoms. There was a constant desire to urinate which lasted for two days, associated with dribbling of urine and pain, which he describes as an uncomfortable burning sensation along the urethra. This gradually passed away in a few days.

Status Presens.—No frequency or other urinary disturbance. Feels well, except for fear of return of hæmaturia and pain.

Examination.—General condition good. Mucous membranes good color. Conjunctivæ clear. No tophi. Chest, clear. Abdomen, negative, except for slight tenderness on deep palpation in the left renal region. Bladder was explored with a Thompson's searcher with negative results. Suspecting a renal or urethral calculus, the patient was referred to me for further examination.

Examination, June 6, 1903. *Urine*.—The urine, voided in three glasses, was examined immediately. Reaction, neutral; specific gravity, 1023; urea, 2.43 per cent. There was no albumen and no sugar. The urine in all three glasses was perfectly clear. The first contained a few shreds, which were found, microscopically, to be made up of mucous threads, together with a few leucocytes. Embedded in the mucus were numerous crystals of calcium oxalate; otherwise the microscopic examination was negative. Palpation of the left kidney region and along the left ureter was not painful.

Rectal.—The prostate was normal, and the microscopic examination of the secretion was negative. Nothing abnormal could be felt above the prostate by bimanual palpation.

Cystoscopic.—Under cocaine anæsthesia, a plain Nitze cystoscope was introduced. A rapid survey of the prostate orifice and the bladder-wall disclosing nothing abnormal, attention was at once directed to the left ureteral orifice. The ureteral papilla on this side was flattened; the ureteral orifice, small, wizened, non-patulous, and appeared to be closed by a plug of mucus. Although

it was watched for several minutes at various times during the examination, no urine was seen to escape from this side.

The right ureteral papilla was very prominent, in marked contrast to the other side. The ureteral opening was large and patulous, and from it jets of urine were ejected with considerable force at intervals more frequent than normal. The associated to-and-fro movement of the trigone was very distinct. The right side of the trigone appeared to be hypertrophied, while the left side was distinctly atrophied. So marked was this contrast in the two sides of the trigone that the provisional diagnosis of a stricture of the left ureter at some point, probably in its lower part, was made.

To clear up the diagnosis, a Casper's catheterizing cystoscope was introduced. After one or two trials, the catheter was engaged and passed easily into the ureter a distance of four centimetres, when it met an impassable obstruction. In the attempt to pass the catheter beyond this point it buckled into the bladder, dragging on the ureteral orifice. The catheter was partly withdrawn and repeated efforts made to pass the obstruction, but without success. The bulging of the catheter into the bladder when the attempt was made to pass it beyond the obstruction was demonstrated to several visiting physicians.

This examination left no doubt as to the presence of a stricture of the ureter four centimetres from its vesical orifice, and, from the history, this was most likely due to a calculus lodged at this point.

The patient was accordingly referred to Dr. Deetjen for radiographs of the left kidney and ureter. Excellent plates were obtained. In the latter plate was to be seen a very distinct shadow in the left pelvic space, at a point corresponding to the obstruction as determined by the catheter. The diagnosis of a calculus impacted in the ureter just above its entrance into the bladder-wall seemed fully justified.

Iliac extraperitoneal ureterolithotomy was performed by Dr. James F. Mitchell, of Washington, assisted by the writer.

Operation, July 29, 1903.—Left Iliac Extraperitoneal i'reterolithotomy; Suture of Ureter; Iodoform Gauze Drainage.

An incision, beginning a little inside and above the anterior superior spine of the ilium and extending obliquely forward and downward towards the middle of Poupart's ligament, was made

and rapidly carried down through the muscles. Care was taken to avoid the internal ring. The peritoneum being exposed, it was retracted inward by stripping it up, thus exposing the psoas muscle and the iliac artery. The ureter was at once recognized adhering to the rolled-up peritoneum, from which it was separated by blunt dissection. A small strip of gauze was placed around it for use as a retractor. There seemed to be no dilatation of the ureter, its appearance varying little from the normal. Following it down into the pelvis, a hard nodule was felt lying deep down about one inch above the bladder-wall. Attempts were made to dislodge this upward, but without success. retraction the stone in its deep-lying position in the pelvic ureter was readily exposed without enlarging the incision by a transverse cut across the fibres of the rectus. With good exposure, two mattress sutures of fine silk on a French needle were placed in the ureter, using the stone as a bobbin. Between the sutures so placed a small longitudinal incision into the ureter was made, and the stone easily removed by a pair of mosquito clamps. A ureteral bougie passed without obstruction through the wound into the bladder and upward to the pelvis of the kidney. Having determined the patency of the ureteral canal, the two mattress sutures were tied. It was not found necessary to reinforce them with Lembert sutures. A narrow strip of iodoform gauze to the wound in the ureter was brought out of the lower angle of the wound. The muscles were sutured with buried silver wire, and the skin with subcutaneous silver wire. Silver-foil dressing was used.

Postoperative History.—There was no leakage of the ureteral wound. Slight infection of the drainage canal delayed healing somewhat, but the patient was out of the hospital in four weeks. Recovery was complete. There has been no return of symptoms thirteen months after operation. The patient has been at work steadily since leaving the hospital; his general condition is excellent.

The calculus is small, oval in shape, measuring I by .5 centimetre, with a very rough, finely spiculated surface. It is very hard, and belongs undoubtedly to the oxalate of lime group.

CASE II.—H. R., aged thirty-two years; admitted July 18, 1903, complaining of "enlargement of the prostate" and frequent micturition.

Family History negative.

Previous History.—He denies all venereal infection. At the age of ten years, the patient had his first attack of "colic," which he describes as a sharp continuous pain in the right side just below the right costal margin. It was well localized and did not radiate. This attack lasted several hours, and was so severe as to require hypodermics of morphine. These attacks recurred at frequent intervals for about four years; they were similar to the first one, but associated with hæmaturia, which continued for several days. After a period of freedom from the colic for eight years he had in 1893 another attack similar to the previous ones, and associated with bloody urine. Up to this time there had been no other urinary disturbance. Following the severe attack of colic which occurred in 1893, the patient first noticed the symptom for which he now seeks relief. At first the frequency of micturition was only slightly increased. He had to get up once at night to This gradually grew worse, until the frequency was marked both day and night. There was no pain during micturition, and at no time was blood noticed, although, in 1897, the urine was examined microscopically and was reported to contain blood.

The necessity of passing his water so frequently day and night interfered so much with his rest that he became very nervous and generally broken down. His condition became so distressing, that in 1903 he came from the Southwest to St. Louis for treatment. A physician there told him he had an enlarged prostate; that he would either have to have an operation or wear a retention catheter.

While in St. Louis he had another attack of colic, lasting several hours, and requiring morphine to control the pain. He came on to Baltimore for the operation on the prostate which had been advised. No instruments had ever been passed into the bladder. Attempts to do so had been made, but his urethra was so sensitive that the catheter could not be passed beyond the sphincter, even after the use of cocaine.

Examination.—The patient is very nervous and restless, but otherwise healthy. Examination of chest, negative. There is marked tenderness over the right kidney and, especially, the right ureter. Deep pressure over the latter causes the patient to cry out with pain at the point of pressure and in the penis.

Rectal.—Prostate very tender, otherwise normal. Secretion

normal. Nothing could be felt in the ureters by bimanual palpation. Rectal examination was very painful, although there were no hæmorrhoids and no fissure.

Urine.—July 18, all three glasses cloudy; specific gravity, 1020; faintly acid. Microscopic: free pus-cells, few red bloodcells, no infection.

July 19, all three glasses clear. Microscopic: occasional leucocyte, no red blood-cells.

This marked difference in the two examinations was due to the fact that at the first visit the urine showed a small amount of blood and pus associated with the attack in St. Louis, while one day later it had completely cleared up.

July 20, the second glass contains a shred which, microscopically, is seen to be made up of mucus in which is embedded a great abundance of calcium oxalate crystals and a few leucocytes.

Cystoscopic Examination.—By using cocaine in the anterior urethra, then passing a catheter and depositing cocaine, 4 per cent., in the posterior urethra and bladder, the cystoscope was passed easily, and the examination was practically painless. No residual urine was found. Bladder capacity, 200 cubic centimetres. Mucous membrane was normal. Just behind the prostate lay a small, irregular mass which looked like a blood-clot and rolled from side to side as the patient was moved. The right ureteral opening was small, slit-like, emitting jets of clear urine at long intervals. There was no marked difference in the two sides of the trigone as in Case I.

The day following the cystoscopic examination, the patient came to the office, assisted by a friend, complaining of severe colic. He was all doubled up with the pain, which was chiefly in the penis. Pressure over the kidney and the bladder increased the pain. He would lie on his back, with the thighs strongly flexed on the abdomen, holding on to his penis with both hands, crying out with the severe pain. The next day he had another attack; this time the pain was localized in the right kidney, and was not referred. He urinated frequently, each time passing only a few cubic centimetres, containing red blood-cells and leucocytes in considerable numbers.

He was sent to Dr. Deetjen for radiographs of the right kidney and ureter. The latter plate showed a sharp, well-defined shadow in the course of the right ureter, apparently above the pelvic brim. Catheterization of the right ureter seemed unnecessary.

Operation, July 29, 1903.—Extraperitoneal Iliac Ureterolithotomy; Exploration of Entire Length of Ureter and Palpation of Kidney; Suture of the Ureteral Wound with Fine Silk; Small Iodoform Gauze Drain to Ureteral Wound; Heavy Silk Suture of Muscles and Fascia; Subcutaneous Silver-Wire Suture.

An incision beginning midway between the crest of the ilium and the last rib, and extending obliquely forward and downward just within the anterior superior spine of the ilium was made, and rapidly carried down through the muscles. The peritoneum was stripped back towards the midline, exposing the psoas muscle and the iliac vessels. The ureter, which was slightly larger than normal, was easily recognized adhering to the peritoneum, and had been lifted up with it in the process of stripping it back. The ureter was freed by blunt dissection and a piece of gauze placed around it which was used as a retractor. On account of the apparent position of the calculus as seen in the X-ray plate, the upper part of the ureter was first explored, but nothing was found, although it was carefully palpated up to and including the pelvis of the kidney. Attention was then directed to the lower portion of the ureter, which was exposed by prolonging the skin incision downward towards the middle of Poupart's ligament, care being taken to avoid the inguinal canal. Following the ureter downward, a thickening about two centimetres long was found deep down in the pelvis about one inch above the bladder-wall. Within this thickened portion, which was evidently the result of an old periureteritis, a small, hard nodule could be felt and recognized as a small calculus. After repeated efforts, this was "milked" upward above the pelvic brim. Using it as a bobbin, two mattress sutures of fine silk were placed, care being taken to avoid including too much tissue in the sutures, and thereby producing a stricture when the sutures were tied. The calculus was then easily removed through a small longitudinal incision. A ureteral catheter, introduced through the wound, passed into the bladder and upward to the kidney. There was no stricture of the canal and no other calculi present. The wound in the ureter was then closed by tying the mattress sutures. These were reinforced by a single Lembert suture of the same material. A single strip of wide iodoform gauze was placed over

the incision in the ureter, and the muscle and fascia were then sutured with heavy black silk. The skin incision was closed by a subcutaneous silver-wire suture.

Postoperative History.—There was no leakage of urine. The drain was removed the second day. The wound was entirely healed on the tenth day, when the subcutaneous wire suture was removed. The patient made an uninterrupted recovery. He was up and about the ward in two and a half weeks, and left the hospital on the twenty-fifth day.

Immediately following the operation, the marked frequency of urination subsided. He was able to sleep through the night without having to urinate, and during the day held his urine three hours without any discomfort.

Note, April 18, nine months after the operation. The patient has been working steadily for the past eight months. He has been entirely free from attacks of colic. He does not get up at night to urinate. During the day he can hold his water on an average of three and a half hours.

Urine perfectly clear; acid; specific gravity, 1015; no albumen; no infection. Microscopical examination negative. Bladder capacity is smaller than normal. He complains when 300 cubic centimetres have been introduced, but after dilating the bladder a few times under pressure, 520 cubic centimetres were introduced without causing much pain. The wound is perfectly solid. The patient's general condition is excellent. He says he never felt better.

Remarks.—In these two cases the diagnosis was made and the calculus located before operation by the special methods of examination which we now have at our disposal. In Case I, the ureteral catheter indicated the exact location of the stricture, and the radiograph confirmed the result of this examination, showing a well-defined shadow at the corresponding point in the ureter. In Case II, the ureteral catheter was not used, as the patient was suffering almost constantly from renal colic while under observation, and the nature of the pain, etc., made it very evident that the calculus was low down in the ureter. The radiograph, in this case, showed a well-defined shadow in the course of the ureter, which left no doubt as to the correct

diagnosis. It is to be noted, however, that we were somewhat misled as to the exact location of the calculus. In the radiograph, the shadow appeared above the pelvic brim, apparently about the middle of the ureter. At the operation, therefore, this portion of the ureter was first exposed; no stone being found, the upper half of the ureter was next explored with likewise negative results. The calculus was finally detected deep down in the pelvic portion of the ureter, just above the bladder wall. This difference in the position of the calculus, as shown by the radiograph, and as found at the operation, might be due to a change in the position of the calculus after the X-ray examination was made. That such a change of position was possible is evident from the fact that, although the ureter above the stricture was only slightly dilated, the stone was "milked" upwards to a point above the pelvic brim before it was ex-It is evident, however, that considerable irritation had been caused by the stone in its deep lying position, as there was at this point a distinct thickening of the ureter, due, no doubt, to a periureteritis.

The striking feature in both of these cases was the marked vesical irritability. In Case I, the symptoms were so characteristic of stone in the bladder that this condition was at first suspected and the bladder explored by Thompson's searcher; while in Case II the frequency of urination day and night was a most marked and distressing symptom. It is also interesting to note that this patient presented exquisite tenderness of the whole urethra. The sphincter urethræ was so firmly contracted that it was almost impossible to force an irrigating solution into the bladder, or to pass a catheter beyond the sphincter, except by first instilling cocaine into the anterior urethra. This condition of hyperæsthesia of the urethra has largely disappeared since the operation.

Another striking feature of Case II was the localization of the pain during the attacks of colic. At times the pain was confined to the kidney region, radiating to the back: while at another time it was strictly localized in the penis. the patient

lying on his back, with the thighs strongly flexed on the abdomen, and the penis grasped with both hands.

While ureteral calculi give rise to no localizing symptoms by which we are able to determine from the symptoms alone in what part of the ureter the calculus has been caught in its descent from the kidney, it has been frequently noted that, when the stone lies in the lower portion of the ureter, it gives rise to marked vesical irritability, producing symptoms simulating those of vesical calculus, as in Case I, or marked frequency of urination with or without accompanying pain, as in Case II. In a case reported by Steward, the symptoms were those of stone in the bladder, and, in spite of the negative exploration of the bladder for calculus with a Thompson's searcher (a cystoscopic examination was not made), a suprapubic cystotomy was performed. The bladder was found free from stone, however, but a calculus was palpated in the right ureter just above its entrance into the bladder-wall. The calculus was removed later by a transperitoneal operation.

In the cases reported by Morgan (Pitt's case),2 Bishop,3 Newman,4 and Young,5 in which the calculus was caught at the vesical orifice of the ureter, the vesical irritation was a marked symptom. In all of these cases the calculus protruded into the bladder cavity, covered only by very thin mucous membrane, as in Pitt's and Newman's cases, or free and uncovered, as in Young's and Bishop's cases. Hence, it is not surprising that the symptoms produced simulated those of vesical calculus, i.e., frequency of micturition associated with pain referred to the glans penis. But, as has already been noted, calculi lodged in the paraischial and juxtavesical portions of the ureter also give rise to bladder irritation, as in the last case reported by Young (Annals of Surgery, 1902, xxxvii), and in Cases I and II above. In the last two cases found in the literature, those reported by Barling,6 it is stated that no symptoms were present, which indicated that the calculi had left the kidney; hence, an operation for the removal of stones from the kidney was first undertaken in each case, and it was only by probing the ureters that the calculi were found lying deep down in the

pelvic ureter, just above the bladder, and removed by "milking" upward and extracting through a longitudinal incision higher up in the ureter. Unfortunately, the report of these cases is incomplete. We are not informed as to the presence or absence of bladder symptoms.

I believe that vesical irritation associated with attacks of renal colic suggests strongly that the stone has slipped into the ureter, and has been caught in its descent at a point low down in the pelvic portion.

Calculus of the lower end of the ureter is a rare condition, if we may judge by the number of cases reported. But we suspect the cases are more numerous than these statistics would lead us to believe. Except in those cases in which the stone is caught at the vesical orifice and projects into the bladder cavity, the diagnosis has been made before operation in comparatively few cases.

In the forty-six cases of stone in the ureter collected and tabulated by Morris ⁷ in 1899, in but very few was the diagnosis made before operation or autopsy. In the sixteen additional cases reported in his recent work on the kidney and ureter, the same statement is true. If, in the majority of cases, the condition was unrecognized, and if, in a considerable number of cases, calculus of the ureter has been found accidentally at autopsy, no symptoms having been present leading to a suspicion of their presence, it may be asked. How many cases go unrecognized altogether? There can be little doubt that this number has been large.

The improved methods of diagnosis enable us at the present time to recognize these cases with greater ease, and in a certain percentage of cases to determine the exact point of impaction. The condition can be recognized before the kidney has become disorganized, or the patient's life is jeopardized by such complications as pyonephrosis and calculous amuria, or made almost unbearable by years of torturing pain; and the question of early diagnosis is one of considerable importance. Although, as has been pointed out, a patient may carry a stone in the ureter for years without suffering with the usual attacks

of renal colic, or presenting any symptoms indicating its presence, and without showing any evidence of that slow, but progressive, destruction of the kidney often associated with this condition, yet such cases are unusual, and one can never say, in any given case, just what course matters will take. In this respect the condition is similar to that of inflammation of the appendix.

If a stone has remained impacted in the ureter for any considerable length of time, the chances of its being finally passed into the bladder are remote; and to leave it undisturbed is dangerous.

Young,⁵ in his report in 1903, collected from the literature eighteen cases of stone impacted in the lower end of the ureter in the male which have been operated upon. To this number may be added another case operated upon by Young and included in a later report, two cases reported by Barling, and one reported by Steward in 1901 and overlooked in the above collection, and the two cases here reported, making twenty-four cases in all to date.

These cases are grouped, according to the operation, in the following table.

Operation.	Number.	Recovered.	Died.	Not Stated.
I. Intravesical	9	6	• •	3
Suprapubic cystotomy	6	4		2
Catheter cystoscope	I	1		• •
Lithotrite	I	1		••
Perineal urethrotomy * .				I
2. Prerectal	I	I		• •
3. Intrarectal	I	• •	I	••
4. Transperitoneal	I	1		• •
5. Iliac extraperitoneal	12	IO	2	• •
Totals	24	18	3	3

^{*} Morris, in his work referred to above, p. 473, says: "The perineal incision is said to have been practised by Desault and Garengeot." In his interesting work, "Traite des Maladies des voies urinaires," Desault reviews the methods then in use for removing calculi impacted in the ureter at its vesical orifice. These he considered inadequate. He described a new operation and devised a new instrument, which he called a "coupe-bride," for use in these cases. Unfortunately, no diagram of this instrument is

The technique of the operation is as follows:

A perineal cystotomy was first performed. The finger was then introduced into the bladder in order to locate the stone caught at the vesical orifice of the ureter and exposed within the bladder. With the stone thus located, the coupe-bride was then introduced into the bladder through the wound, and the collar about the calculus, formed by the folds of mucous membrane, was engaged within the jaws of the instrument. This collar is then cut by sliding the blade of the instrument within its sheath. If the collar tissue is not prominent enough, or the beak of the instrument cannot be engaged between it and the stone, it was advised to grasp the tumor formed by the stone, within the jaws of the instrument and to cut the envelope thus fixed. One can increase at will the size of the incision. This procedure allows the stone to fall into the bladder, and it is then extracted in the usual way.

Although no cases are reported, this operation was apparently performed, and was considered by Bichat very much superior to the methods then in use.

There seems to be a wide divergence of opinion among operators as to the best method of attacking a stone lodged in this portion of the ureter. But, as our experience with this condition increases, there can be little doubt that a more uniform method of procedure will be adopted, and many of the operations which have been suggested or actually carried out will cease to have other than historic interest. The intrarectal route, which was employed in only one case,⁸ and followed by a fatal result, has nothing to recommend it.

The perineal route, employed by Fenwick 9 in one case, has the great objection that it does not permit exploration of the ureter and kidney. In addition, the technical difficulties of the operation are such as to require very urgent indications for interference before one would be willing to undertake this operation.

given. From the description of the technique, however, one gets the impression that the coupe-bride was not unlike the Bottini instrument in its principle of construction.

In 1892, Cabot 10 suggested removing the calculus through a modified Kraske incision. In a recent article on "Calculous Anuria," he refers to this as follows: "This lowermost part of the ureter in the male is more difficult of access. The writer, in the article above alluded to, pointed out the fact that this portion of the canal could be reached extraperitoneally by a Kraske incision with removal or displacement of part of the sacrum." This sacral route has never been employed in the male. Morris, in his "Surgery of the Ureter and Kidney," records two cases, both female, operated on in 1900 by a modification of the sacral route. Cabot concludes his recent article as follows: "In some cases, the aid of the hand within the abdomen may enable us to remove a stone deep in the pelvis, through an extraperitoneal incision." It seems to us that the sacral route is not only unnecessarily severe and destructive, but is open to the same objection as that urged against the perineal operation, namely, that it does not permit thorough exploration of ureter and kidney. In every case of ureteral calculus, the ureter, above and below the site of impaction. should be thoroughly explored by bougies to determine the patency of the canal. Stricture of the ureter below the calculus is not infrequently found. This may be the chief factor determining the point at which the stone is arrested in its descent from the kidney, or it may result from the inflammatory changes produced by the foreign body within the canal. every case a thorough examination should be made, and, if a stricture be present, it should be dilated by suitable means. Without giving careful attention to this important detail of any operation for the removal of ureteral calculi, we can expect only a greater percentage of recurrences, since one of the causes which leads to this condition has not been removed. In the earlier operations for stone in the kidney, the possibility of a stone in the ureter was overlooked, and in many a persistence of the symptoms necessitated a second operation. At present, no operator considers a nephrolithotomy complete and thorough without a careful examination of the ureter to insure its patency and freedom from calculi. It is quite as unpardonable to close a ureterotomy incision before a careful examination of the entire length of the ureter and the kidney pelvis has been made in order to determine the presence of other calculi or a stricture at some point in the canal.

The transperitoneal route has been employed but once in the male for a stone in the pelvic portion of the ureter. This case, reported by Steward, 1901, may be briefly summarized.

Man, twenty-four years, suffered three years from attacks of painful micturition, associated with hæmaturia. At time of operation, the urine contained considerable blood and pus. No pain, tenderness, or fulness over either kidney or ureter. The bladder was sounded with negative result, and two radiographs showed nothing abnormal. Nevertheless, the symptoms were so characteristic of vesical calculus that the diagnosis of encysted calculus of the bladder was made and a suprapubic cystotomy performed. The bladder was free, but a stone was felt in the right ureter at a point two inches above its vesical orifice. The suprapubic wound was closed, and, nine days later, an incision was made in the lower right linea semilunaris, and the abdomen opened. The stone was located and pushed up to a point just above the common iliac artery. The ureter was then incised and the stone removed. The incision in the ureter was closed with a continuous suture of fine silk, and the peritoneum was sewn over it. The calculus, cylindrical in shape, measured one-half by one-third inches, and weighed nine grains.

The good result in this case depended on the fact that there was no leakage from the ureteral incision. But one can never be sure in any case that leakage will not occur, even when the stone is dislodged from the point of impaction upward to a point where the sutures can be more easily and accurately placed, and the tissues of the ureteral wall are not damaged. If the urine be infected, as is not infrequently the case, the danger of infection of the peritoneal cavity is well-nigh unavoidable. This accident occurred in one of the three cases in which this operation was employed in the female, the patient dying of peritonitis. Morris says it is safer to remove the stone by an extraperitoneal rather than a transperitoneal operation, even when its existence and location have been determined by an intraperitoneal search.

These various operative procedures for the relief of this condition in the male represent various stages in the develop

ment of our technique. When it is considered that, no longer ago than 1898, the pelvic portion of the ureter was held to be inaccessible, we can appreciate the rapid strides which have been made in the surgery of this region.

The iliac extraperitoneal route is generally held to be the best method of reaching and extracting calculi from the upper three-fourths of the ureter. As long ago as 1882 Bardenheuer operated in this way, and since then the method has become generally used. It seems to have been taken for granted, however, that the lower portion of the ureter is inaccessible through this incision. But a reference to the table here given shows that calculi impacted in this portion of the canal have been removed in twelve cases by eight operators.

In a large number of cases, it has been found possible, after exposing the ureter and locating the stone, to dislodge it upward and remove it through an incision higher up where the ureter is not so likely to be damaged and, for that reason, leakage is less likely to result.

In Case I, reported above, the stone was impacted at a point one inch above the bladder-wall. It was found impossible to dislodge it upward. An incision into the ureter was made over the stone at the point of impaction, the stone removed, the ureter explored, and the wound closed with two mattress sutures of fine silk. There was no leakage.

Furthermore, Young (Case I), after removing a calculus lodged in this situation, found, on examination, a tight stricture below the stone, one centimetre from the vesical orifice, which could not be dilated by bougies. Through the same incision, the bladder was drawn over and an incision made into its lateral aspect, through which the ureteral orifice was exposed and the stricture cut intravesically. This procedure is graphically shown by drawings accompanying his article in Annals of Surgery, Vol. xxxvii.

These cases show conclusively that this portion of the ureter is as freely accessible by means of the iliac extraperitoneal route as is the upper portion. They show that the ureter can be explored throughout its whole extent, down to

the bladder-wall; that the stones in the lower part may be either dislodged upward and extracted at a higher point, or removed by incision of the ureter at the point of arrest, and the wound sutured. Finally, these cases show that when there is present a stricture in the intramural portion of the ureter, the bladder may be incised, and the necessary additional procedures carried out, without making a separate suprapubic incision.

Extraperitoneal ureterolithotomy is a highly successful operation. The mortality should be even less than that for nephrolithotomy. And with an operation combining such small risk, with so great technical simplicity, this part of the urinary apparatus will be as fearlessly and as successfully exposed as the other portions which have long been considered more easily accessible.

The intravesical portion of the ureter is most readily and most satisfactorily reached by suprapubic cystotomy. This gives the best exposure; the operation on the ureter can be carried out under guidance of the eye.

Calculi in the intravesical or intramural portions of the ureter then are best reached by the suprapubic intravesical route; calculi impacted in the juxtavesical and paraischial portions should be removed by the iliac extraperitoneal route.

BIBLIOGRAPHY.

¹ Steward. Lancet, 1901, i, p. 1142.

² Morgan. Lancet, 1898, i, p. 560.

⁸ Bishop. Edinburgh Medical Journal, 1900, Vol. i, p. 47.

Newman. British Medical Journal, 1903, ii, p. 949-

^a Young. American Medicine, Vol. iv, No. 6, pp. 209-17.

⁶ Barling. British Medical Journal, 1903. ii, p. 1532.

Morris. Lancet, December 16. 1899.

^{*} Ceci. La Reforma Medica, September 5, 1887, p. 1214.

Fenwick. Edinburgh Medical Journal, 1898, p. 281.

¹⁶ Cabot. American Journal of Medical Sciences, 1892, p. 43.

stone.

in glans after micturition. Lumbar

Right.

Eighteen months.

18

(B) 2. Fenwick.

teral calculus.

Right

years. Several

<u>E</u>

(A) 1. Ccci.

desire to urinate, pain in

Colic. with

Seven years. | Left.

31

(C) 3. Young.

pains.

Number.

Prominent Symptoms.

Side.

Duration.

Age.

Reported by

	H	ARRY	ATWOOD	FOWLER
re-	cys-	ted.	ture. Iney. reter	cog- cog- owed Pa-

Intravesical.

Right. Frequency of mic- | One.

Several years.

53

(D) 4. Freyer.

glans penis.

Pain in

turition.

Negative exploration of kid Stone projecting from u Recovery. Patient had urethnal strict

of bladder. Condition re-Diagnosis of encysted calc nized by suprapubic cystoto Large vesical calculus rem by suprapubic cystotomy. detected by cystoscope.

Vesical calculus size of plumfinger in rectum.

inch | Intravesical, cov- | Recovery

74

One,

..... | Right. | Vesical calculus.

6

Case. 7. Pitts's

ered by mucous

membrane.

weeks.

in six

tient died eight months later. Stricture of vesical orifice of stone removed. Ureter divided, and stone extracted with a probe with pressure by

₹.

Three years, Right, Painful micturi- One. Hæmaglans. uria. tion. Elderly Three years. Lcft.

24

(E) 5. Steward.

(F) 6. Helfer-

Lumbar pain.

Hæmatu-

One, 2 x 5 cm.

bladder.

Two inches above | Recovery. Intravesical, pro- Recovery. ecting into vesical orifice

Rccovery. | Vesical calculus removed cight

Intravesical.

calculus. One.

Eight days. | Right. | Vesical

Bishop.

into | Recovery

One, I inch long. | Protruding

Right. Vesical calculus.

''Long time."

8. Bishop.

in two

days before.

	SI	CON	ΕI	N	THE !	LO	WE	ER	URE	TER	(M)	ALE).	961	
Thought to be fibroma, and removed by vulsellum forceps.	Vesical calculus, phosphatic, behind enlarged middle lobe of prostate. Removed by vulsellum forceps.	Ureter sutureâ.	Catgut closure.	Died of heart failure in thirty-	Nephrectomy follor ectomy. Ureter li der entrance and	Nephrectony for pyonephrosis followed by total interrectomy.	Suture of ureteral wound.	Bladder incised through same wound and stricture at lower	end of ureter incised. Su- tured.	Sutured.	above Recovery. Ureter studded with calcium oxalate. Sutured.	Stone removed from urethra in	Sutured. No	v2	tomy. (G) Iliac extraperitoneal.
Not stated.	Not stated.	Recovery.	from Died.	Died.	Recovery.		Recovery.	Recovery.		above Recovery. Sutured.	Recovery.	Recovery.	Recovery.	Recovery.	(F) Suprapubic cystotomy.
of Intravesical, cov- Not ered by thin, sta vascular nucous	Intravesical.	Near vesical end. Recovery.	One inch from bladder.	Juxtavesical.	Filling entire ureter.		Pelvic ureter.	Juxtavesical.		One inch above	_	Three inches be-	One inch above	Diadeel. One inch above bladder.	
size.	One, small red cherry.	One.	Fwo.	One.	One, 3 cm. in diameter; 17 cm. long.		Three.	One.		One.	One.	One.	One.	One.	otrite. (E) Transperitoneal.
Frequent mictu-	Vesical calculus. (No renal symptoms.	Abdominal pain. C	Patient in uramic Two.	Colic. Hæmaturia. One.	Pain in left kidney. One, 3 cm. in di- ameter; 17 cm. long.			Colic. Continuous	bladder, and constant desire to	urmare. Colic. Pain in bladder.	Lumbarpain. Vom- iting. Hænatu-	Colic.	Colic. Symptoms of	Colic with hæma- turia. Frequency of micturition	(C) Catheter cystoscope. (D) Lithotrite.
Right.	Right.		Right. I	Right. (<u>.</u>	Left.			Right.	Left.	Left.	Right.	Right.	Catheter
Several years.	Several years. Hæmaturia;	Sixteen months.		Six years.	Nine years. Left.		Ten years.	Twenty-	years.	Five years.	Since child- hood.	Two years.	Twenty.	Twenty- two years.	(B) Prerectal. (C)
35	54	8	9‡	31	33	:	33	56		25	20	33	36	32	
10. Newman.	II. Newman.	(G) 12. Twynam.	13. Morison.	14. Israel.	15. Israel.	16. Israel.	17. Young,	18. Young.		19. Young.	20. Barling.	21. Barling.	22. Fowler.	23. Fowler.	(A) Intrarectul.

UNDESCENDED TESTICLE.

BASED ON A STUDY OF SEVENTY-SEVEN CASES.1

BY WALTER B. ODIORNE, M.D.,

AND

CHANNING C. SIMMONS, M.D.,

OF BOSTON.

THE deformity resulting from a partial or faulty descent of the testicle has been recognized for centuries, and has been commented on by many of the earlier writers; yet not until the last half-century has the condition been given the prominence which it merits on account of its comparative frequency and importance from a surgical stand-point. The literature abounds in reports of single cases, and articles dealing with special branches of the subject; yet there is a notable lack of valuable statistics drawn from the careful study of a large series of cases. There exists a wide variance in the opinion of surgeons as to the proper method of treatment, and of pathologists as to the significance of the condition. It is interesting to note that mention of cases of abnormal position of the testicle was made in the works of Paré, Meibomius, and Salmuth, and, antedating these, from the fourteenth century we get the supposedly authentic information that Tamerlane, the conqueror of Western Asia, was himself afflicted with this deformity.

John Hunter,¹ in his earliest published work, first gave the subject prominence by describing the normal descent of the testicle in the fœtus, and mentioning abnormalities in this descent. The first surgical operation to correct the position of an undescended testicle was performed by Koch, of Munich, in 1820. Lecompte ² in 1851 mentioned the frequency of

¹ Seventy-four of these cases were treated at the Massachusetts General Hospital, and are included in this report through the courtesy of the Visiting Staff.

malignant disease, and most writers in the first half of the last century dwelt exclusively on this point. (Arnott,³ 1848; Gowers,⁴ 1849; Spry,⁵ 1857; Johnson,⁶ 1859.) Godard ⁷ in 1857 wrote the first exhaustive article on the subject. Curling,⁸ in 1866, in his work on "Diseases of the Testis," dwelt especially on this condition. Since then no elaborate work covering the entire subject has appeared until the publication of the Hunterian Lectures on "The Imperfectly Descended Testicle," by W. McAdam Eccles.⁹

There should be a distinction drawn between the terms undescended testicle, by which is meant one which has been arrested at some point in its normal course of descent, and imperfectly descended testicle, as used by Eccles, and which includes the above class as well as the various forms of ectopia.

The term ectopia of the testicle is used to designate a malposition of an organ which in its descent has deviated from the normal course. There are three forms of ectopia: (1) That in which the testicle occupies a position in some part of the perineum. (2) In which the testicle is situated in Scarpa's triangle, often referred to as the crural form. (3) In which it is placed near the root of the penis, or subcutaneously above the inguinal canal.

These positions correspond to the attachments of certain fibres of the gubernaculum testis, which fibres undoubtedly are instrumental in bringing about the malposition. Tuffier 10 reports that in a dissection of three cases the attachment of the gubernaculum was never found in the scrotum. In one of his cases, a distinct band of gubernaculum was found traversing the perineum to its attachment near the anus.

The term monorchidism is often erroneously used to designate a condition where it is impossible on superficial examination to locate one testicle. In reality this is a misapplication of the term, which should be restricted to entire absence of one testicle, a condition of doubtful occurrence except in hermaphroditism: the correct nomenclature would be monocryptorchidism. An individual in whom neither testicle can be located is a double cryptorchid.

Curling reports a case of fused testicle consisting of one organ with two epididymes and two cords. Christopherson ¹¹ reports a case where at operation he found both cords passing out through the same canal, and both testes, one rudimentary, on the same side of the scrotum. Polyorchidism is extremely rare. Only one authentic case has been reported (Lane ¹²) in which the condition was verified by autopsy and microscopic examination. Many cases thought to be examples of this condition are undoubtedly tumors. In the following consideration of the subject, attention is paid only to the undescended or partially descended testicle.

Occurrence.—It is very difficult to compute with accuracy the percentage of individuals who have undescended testicles. In the first place, hospital statistics are misleading, for patients seeking treatment with this condition usually present themselves for some complication such as hernia, inflammation, etc., rather than for the relief of the deformity itself.

The most accurate statistics obtainable in adults were made by Marshall, quoted in Kocher's "Surgery," who in the examination of 10,800 recruits found twelve cases,—one double, five right, and six left,—that is, 1 to 900. This, even, is inaccurate, for men, recognizing the fact that they were imperfect in this respect, might not apply for the army.

As the testicle, undescended at birth, very frequently completes its descent during childhood, the percentage of occurrence varies in inverse ratio to the age of the individual up to puberty. Various authorities place the limit of age, after which descent is unlikely to take place, from the first to the fourteenth year. Curling states, however, that, if the testicle is not descended at one year, it is very unlikely to come down, but the statistics of other observers and the following cases would tend to refute the statement.

CASE 3.—Aged fourteen years. Right undescended testicle with hernia. Left testicle descended at five years.

Case 30.—At age of thirteen right testicle could not be felt. One year later it was found subcutaneously above the external ring.

A case, not in the table, brother of Case 74, had both testes in canal up to age of thirteen, when they descended, massage having been used.

Sach,¹³ in an examination of 143 male infants, from one to four months old, found 14 per cent. of cryptorchids, twelve cases being double cryptorchids. Wrisburg, quoted by Curling, examined 103 male infants at birth, and found that 30 per cent. of them had one or both testicles partially descended. In twelve cases, one or both testicles were still retained within the abdomen; but three weeks later he examined ten of these twelve, and found in every case the organ in normal position.

Gubernaculum.—As the gubernaculum undoubtedly plays an important part in the descent of the testicle, a brief description of its development and association with the testicle is in order.

It is derived from a fold of peritoneum covering the Wolffian body, and extends in early embryonic life from the lower part of the primitive kidney to the inguinal region. The testicle is developed from the genital fold, lying between the Wolffian body and the median line. As it develops, the Wolffian body shrinks; part of it, however, forming the epididymis and the vas deferens. The gubernaculum transfers its upper attachment to the lower portion of the testicle. It is composed at this time of a fold of peritoneum surrounding fibrous connective tissue. Later, smooth and striped muscular fibres appear, probably derived from the abdominal muscles. As the lumbar spine grows, the gubernaculum holds the testicle in a fixed position, so that at the end of the sixth month it lies close to the internal abdominal ring. Now the gubernaculum extends through the inguinal canal and has its main attachment at the base of the scrotum. Fibres, however, find attachment in Scarpa's triangle, the perineum, and at the root of the penis.

It is a much disputed point whether the gubernaculum assists in the descent of the testicle by muscular contraction, cicatricial contraction, or whether its rôle is simply a passive one. At the sixth month, with the descent of the gubernaculum

into and below the inguinal canal, a finger-like process of peritoneum—the processus vaginalis—accompanies it and passes into the scrotum, where the lower portion later forms the tunica vaginalis, the upper portion being obliterated.

Cause.—The precise cause of arrest of the testicle in its normal descent is hard to determine, but is invariably due to some defect in development during embryonic or fœtal life. In general, abnormalities of the mesorchium, gubernaculum, inguinal canal, or of the testicle itself, together with the epididymis, ducts, and vessels, are assignable as causes in most cases.

As a result of fœtal peritonitis, adhesions may persist which prevent the testicle from entering the internal ring; while in infancy and childhood the pressure of a truss used to withhold an inguinal hernia may also produce the same effect.

Several of the older authorities mentioned heredity as a prominent etiological factor in this condition. Godard believed in its importance, and cited two cases, but of late the tendency has been to treat the matter as of little consequence.

CASE 18.—Man, present age twenty-nine, with right undescended testicle; has a son two years old, with neither testicle descended.

CASE 74.—Man, twenty years old, a double cryptorchid. His younger brother had both testicles descend to scrotum at age of thirteen.

Varieties.—An undescended testicle may be classified according to the position which it occupies. Such classification is in many cases inaccurate, for the organ frequently changes its position.

A testicle may lie (1) entirely within the abdominal cavity, a condition known as abdominal or iliac retention; (2) in the inguinal canal, inguinal retention; (3) just outside the external ring, in close relation to the pubic bone, pubic retention; or (4) in the extreme upper part of the scrotum, puboscrotal retention. Occasionally, with the testicle itself lying entirely within the abdomen, its epididymis is found to occupy the inguinal canal; and in some cases of inguinal retention the

epididymis has descended to the scrotum. But it is easy to understand how one variety may readily pass into another; for example, an inguinal testicle can often be pushed into the abdominal cavity, while one occupying the pubic position frequently enters the canal as a result of muscular action.

Side.—From an examination of the table, it will be seen that the right side is more often affected than the left, for, out of seventy-seven cases, fifteen were double cryptorchids, and in the remaining sixty-two cases thirty-nine were right and twenty-three were left.

Eccles has stated that the right testicle was very much more often arrested than the left, which is in accord with the statistics of most writers. This is to be expected, in view of the fact that the left testicle is normally placed lower than the right, due perhaps to a greater length of the spermatic cord.

Position.—It is well known that the inguinal variety is by far the most common, and the statistics based on the series of cases are in accord with this fact.

Abdominal retention, 17; inguinal retention, 51; pubic retention, 18; puboscrotal retention, 5; subcutaneous, above external ring, 1 (ectopia).

As will be shown later, the inguinal variety is most prone to the various complications and inflammations, and would therefore be more often seen by the surgeon.

In all cases of undescended testicle there is a certain amount of atrophy of the corresponding side of the scrotum. The degree of atrophy varies very markedly. Disregarding the cases of infants and very young children, in whom the precise size of the scrotum is hard to determine, it may be said that the degree of atrophy has some definite relation to the position of the testicle on that side. In high arrest, that is, in abdominal or high inguinal cases, the scrotum in late youth and adult life is usually found to be very much atrophied: while if the testicle is placed just outside the external ring, perhaps occasionally entering the canal, the amount of atrophy of the scrotum is less marked.

Symptoms.—Many men go through life with a single

undescended testicle without symptoms of any kind referable to that defect. In fact, it is probable that the great majority of undescended testicles, especially such as are retained in the abdomen, or have reached a high position in the scrotum, give rise to no trouble whatever except such as would be caused by the knowledge of such imperfect development. French writers dwell on the prevalence of sexual neurasthenia among these men, giving it as a common cause for nervous debility or anxiety; but in this country, as far as can be ascertained, this symptom is not prominent.

The undescended testicle is more commonly the seat of inflammatory conditions than one which is normally placed, for the scrotum forms an admirable covering for the protection of the testicle. This body, lying suspended and loose in the cavity of the scrotum and surrounded by a serous membrane, is capable of great mobility, and can therefore easily slip about within the scrotum, and thus avoid injuries from blows and squeezes (Gray). The testicle retained within the abdomen is free from trauma, and, as Eccles has stated, is as little liable to attacks of traumatic inflammation as is the normally placed ovary.

The same cannot be said, however, of a testicle which is retained within the inguinal canal, or is situated in the pubic region. Such an organ, from its position alone, is very liable to injury. The comparatively fixed position makes it impossible for it to escape the force of blows and the effect of pressure from without, while the sudden and violent contraction of the abdominal muscles, by pressure on the testicle in the canal, is often a cause of most painful and severe inflammation. This may vary in degree from slight sensations of discomfort after severe muscular exertion or straining, up to frequent attacks of very severe pain, accompanied by swelling, extreme tenderness, nausea, and vomiting. These attacks may recur with such frequency as to completely incapacitate the individual for his work.

The following case illustrates the milder type of inflammation.

Case 71.—A single man of twenty-four years, with left testicle retained in canal, where since puberty it had formed a small, tender tumor. For ten years had been subject to attacks of moderately severe pain on exertion, a source of great discomfort and annoyance. He said that the testicle was "much in the way, for it was continually getting hit." At operation it was found greatly atrophied and was removed.

The following gives a picture of a much severer type of inflammation, occurring in an uncomplicated case.

Case 31.—A man, aged nineteen years, had a right partially descended testicle, situated in the pubic region, just outside the external ring. At the age of fifteen, he had a severe attack of pain in right testicle, accompanied by nausea, vomiting, and prostration. During the attack there was a tender tumor, size of fist, in right groin. Since then has had similar attacks three or four times a year, which have interfered greatly with his work. At operation, the testicle was found just outside the ring, considerably atrophied, but freely movable. It was sutured into the scrotum.

Inflammation of an undescended testicle sometimes occurs when the organ is forced into a different position; for example, where an abdominal testicle is made to enter the canal under pressure, or where one which has been retained in the canal is forced out of the ring on to the pubis. Under such conditions, orchitis is apt to occur, and persist until the organ is returned to its former position. A properly applied truss often relieves a patient who is subject to attacks of inflammation due to the above cause, for it prevents the testicle from assuming, under force or pressure, a new position.

The following report illustrates such a case.

Case 18.—A man, twenty years of age, had his right testicle retained within the canal, associated with a right inguinal hernia of moderate size. This condition had existed as long as he could remember. The hernia had always been easily reducible, and the testicle had given him no trouble. He entered the hospital in January, 1895, with his hernia strangulated. This was reduced

under ether, but there was left a tender tumor, size of walnut, situated just outside the ring. For five days the testicle remained in this position, and was the seat of acute inflammation, at the end of which time it suddenly slipped into the canal, with almost immediate relief of all symptoms. He was given a truss and left the hospital.

In December, 1903, about nine years later, he reported that he had worn a truss most of the time; there had been no further trouble. Occasionally, when the truss was left off, the testicle emerged from the ring, causing slight pain and a feeling of weakness.

In the seventy-seven individuals recorded in the table, there were ninety-two undescended testicles, for fifteen had double arrest.

In thirty-four, there were no symptoms referable to the testicle. In thirty-two, there had been symptoms previously referable to the testicle. In twenty-six, there had been no symptoms until the time they came under observation.

Physiology.—During infancy and childhood, the testicle, whether normally or abnormally situated, probably plays no important part in the general development or bodily economy, but at the approach of the age of puberty, and from that period during the lifetime of the individual, the testicle assumes a new importance, special functions are given it which are retained during the whole or part of adult life, and its influence on the development and maintenance of function of the individual is worthy of consideration. At puberty, then, the testicle becomes associated with two distinct physiological processes, (first) the formation of spermatozoa within its tubules, and (second) an undoubted influence, manifest during early and late adult life, on the general development, growth, and bodily economy.

The impairment of function in the undescended testicle in respect to the first of these processes, that is, the production of spermatozoa, is a matter of considerable practical importance. An undescended testicle is almost invariably imperfectly developed, as regards size, consistency, and minute anatomy; and

it is agreed by all observers that such a testicle is incapable of the formation of spermatozoa, in a great majority of cases. This conclusion is based on the microscopic examination of such organs, as well as of the semen of double cryptorchids. Griffiths ¹⁴ has stated that there has never been an authentic case of spermatogenesis in an undescended testicle, but most authorities take a somewhat less positive view. The examination of several undescended organs removed at operation and the clinical history of a case (20) mentioned below show that the process of spermatogenesis is not only possible, but less uncommon than has been generally stated.

Three different views have been held regarding the frequent impairment of function of such testicles.

First. The retained testicle is imperfectly formed from the beginning, and its abnormality is a factor in its non-descent. (Hunter.) Second. The organ, although undescended, is normal until the age of puberty, and it then fails to develop. (Curling.) Third. The testicle, although undescended, becomes a perfect organ at puberty, but then, owing to its faulty position, it soon undergoes retrograde changes, resulting in partial or complete atrophy. (Monod and Arthaud.¹⁵)

It is a fact that some testicles are imperfect in structure from the beginning, never developing after fœtal life or early infancy. Such organs are usually retained within the abdomen, and are always incapable of producing spermatozoa. It is also true that some testicles though undescended are of normal structure during childhood, but undergo none of the changes which are normal at puberty. It is not rare for a testicle which has been retained in its descent, but transplanted in youth to the scrotum by operation, to fail in its development at puberty, although its position then is natural. In other cases there is no doubt but that the malposition of the organ, for one cause or another, is directly responsible in preventing the proper development at puberty, and in the establishment of retrograde changes and atrophy. Griffiths, in experiments performed on dogs, has shown that if normally descended testicles be

returned to the abdomen they become soft and small, and never show active spermatogenesis.

Still another view, which seems to be true in a certain number of cases, has been supported by Bellingham-Smith,16 Monod and Arthaud, and others. They have stated that occasionally in undescended testicles the function of spermatogenesis is established for a time, but that it persists for only a brief interval of years, and then is lost. It is an undoubted fact that all double cryptorchids who have been reported to be the fathers of children have been very young men; their children having been born within the first few years after the establishment of puberty in the fathers. It has been stated that the function is never retained after the age of thirty.

The following case, No. 20 in the table, illustrates this point, as well as proving that not all double cryptorchids are sterile.

J. A. P. entered the hospital in July, 1895, at the age of fourteen. Since birth had noticed a small lump in each groin and absence of testicles in scrotum. The testicles, which were in the canals, occasionally descended to a high position in the scrotum, causing pain, which could be relieved by pushing them back inside the rings. Of late had had more frequent attacks, with greater difficulty in replacing organs. Examination showed considerable atrophy of the scrotum, and the testicles situated within the inguinal canals. An attempt was made at operation to bring the testicle outside the ring, but this was impossible, owing to shortness of the cord. The testicle was, therefore, pushed back into the abdominal cavity, and the canal closed, as in a Bassini operation. No operation was done on the right side.

At age of twenty patient was married, and became the father of a boy ten months later. Examination of patient, January 19, 1904, nine years after the first observation, showed complete atrophy of scrotum. The left testicle could be vaguely felt within the canal. It was soft and very small. On the right the testicle was very small, about one-eighth normal size, soft, and situated just outside external ring. The patient stated that he was leading an active sexual life, and considered himself normal in that respect. His wife had not been pregnant since the birth

of the first child, four years before.

The above-mentioned individual, a double cryptorchid with very marked atrophy of both testicles, was unquestionably fertile at the age of twenty, but the subsequent history of his case suggests that the spermatogenetic function was not long retained. The following case, a man of the same age, also with double inguinal retention, but with very slight atrophy, was apparently sterile.

Case 74.—Aged twenty years. Had always been aware of absence of testicles from scrotum, but had suffered no inconvenience until last two years. Of late, after prolonged standing or unusual exertion, had noticed painful lumps in both groins. Was wearing truss for relief of these symptoms. Examination showed both testicles to be situated in the canals, and fairly well developed, the right being slightly smaller than the left. Scrotum was atrophied. A careful microscopic examination of the semen failed to show the presence of spermatozoa.

Thus it can be seen that no rule can be applied to the spermatogenetic function of undescended testicles. In general, it may be stated that this function is absent in a majority of cases, but the proportion of those in which the organ is capable of the formation of spermatozoa is undoubtedly greater than has been supposed.

An individual with one testicle normally developed and situated in the scrotum is in no way affected as to bodily development and the power of procreation, although the other testicle may have been arrested in its descent. It is perhaps worthy of note that the normally placed organ shows no evidence of compensatory hypertrophy.

Pathology.—The histological appearances of undescended testicles vary within wide limits, and it is impossible to give any anatomical classification. In some cases there is very little, if any, change in the gross appearance of the organ, and even microscopically at first glance the section may appear normal, although on careful examination marked deviation from the properly descended adult organ can be found. In

other cases the testicle is at once recognized as being diseased and pathological. This variability is not constant with the position of the organ or the age of the patient, an inguinal testicle being sometimes more developed than one in the external ring, or an abdominal more than an inguinal. Two testicles from the same position in patients of the same age also may vary, and some parts of the organ may show marked change, while others, often closely adjacent parts, may be comparatively normal.

The changes occur in the albuginea, interstitial tissue, epithelium, and the basement membrane of the tubules, one or all of which structures may be involved.

The changes have been divided by Branca and Felizet ¹⁷ into two distinct groups,—those occurring before puberty and those taking place during adult life. In most cases there is probably little or no change till puberty, unless there has been some trauma; and it must always be borne in mind that no rule can be applied for the amount of this deviation from the normal. (Bezançon. ¹⁸) In this series of cases unfortunately no specimens were removed before puberty, and the following brief description is based mainly on the findings of Branca and Felizet.

In children the change is essentially a fibrous one, and, in marked cases, is represented by the small atrophied testicle sometimes seen in later life, where the organ closely resembles a fibroma, no structures of the normal testicle being demonstrable even with the microscope. The albuginea in the less extreme cases is thickened, and usually two layers can be distinguished. The basement membrane of the tubules is thin, and in many cases cannot be distinguished from the surrounding tissue, the reverse of which is true in the changes occurring in later life. The perilobular connective tissue is increased, making on section the lobules very prominent, and composed of cells of the embryonic variety, but approaching the adult type near the body of Highmore. Interstitial cells are rare instead of being present in comparatively large numbers, as is the case in the normal testicle before puberty. The epithelial

cells lining the tubules are usually of a uniform type, although in some specimens a slight differentiation can be distinguished. The vas and epididymis are, as a rule, normal.

In the Adult.—A testicle occupying a position in the base of the scrotum, or even in the groin, may vary in gross very little from one normally placed, but is usually flaccid and small. The epididymis may show some slight malformation, and is often separated from the testicle by a greatly lengthened mesorchium. The seminal vesicle on the affected side may be atrophied. (Launois. 19) The vas is also usually normal, although tortuous, but will, when dissected out, allow the organ to assume its normal position. On section the tunica albuginea may be thickened, and the cut surface does not bulge in the manner characteristic of the normal gland, although the tubules may "string out" well. In the more fibrous specimens the increase of interlobular connective tissue is very marked.

Microscopically.—The tunica albuginea was more or less thickened in all of the specimens examined, in two being roughly five times as thick as that of the normal organ. The interlobular connective tissue varied greatly in amount, but was in all but one specimen (Case 77, Plate IV, Fig. 2) increased. In three cases (Cases 71, 72, 73, Plate IV, Fig. 1) the organ was composed in greater part of fibrous tissue, while in the remaining five (Cases 1, 44, 47, 52, 70, Plate IV, Fig. 3) the increase, although marked, was not as extreme. Plate III, Fig. 1, gives a good idea of the relative proportions of the tubular and fibrous tissue in a moderate case. The increase of the fibrous tissue was in two cases mainly interlobular, but in the others the lobules were not well marked and the intertubular tissues mainly affected. In Case 77 the proportion of the fibrous tissue to the tubules was approximately the same as in a normal organ, and with a low magnification it could not be distinguished from one. The fibrous tissue in all specimens was of the ordinary type, loose in the greater part of the organ, but becoming more dense near the body of Highmore.

Interstitial Cells.—One of the most striking features of undescended testicles is the so-called interstitial cell which

occur in all cases, and in some of the specimens examined were present in very large numbers. These cells are normally seen in small numbers in the testicles of children, but disappear about puberty, and are not found in the adult organ. descended testicle the reverse is true. Hansemann 26 reports that in the examination of many undescended testicles removed in childhood he rarely found them, while they were invariably present in specimens from the adult. As in this series of cases there were no specimens removed before puberty, it was impossible to verify the first part of this statement, but in all the sections the cells were present. What the function of these cells is in the economy is unknown. It has been suggested that they play an important part in the so-called internal secretion of the gland when active spermatogenesis does not take place. Although this is only theory, yet it is a well-known fact that patients with double retention and non-functionating organs have all the characteristics and desires of the male, which is not true if castration is performed. These cells occur in columns of varying size in the interstitial fibrous tissue between the tubules. According to Monod and Arthaud, they were more frequently seen around the blood-vessels, but in the specimens examined they had no definite relation to any structure of the organ, and were seen in all parts. In places they were in short, single columns, while in others they were in large masses, surrounding four or more widely separated tubules and completely filling the microscopic field. are endothelial in type and of large size, with well-marked outlines. The nuclei are rounded, usually presenting well-marked nucleoli.

Two types can be distinguished, one with clear protoplasm, while in the other the protoplasm is finely granular, giving the cell a dark appearance and making a marked contrast between it and the surrounding loose, fibrous tissue. Still others contain pigment granules, and occasionally rod-shaped crystals.

Tubules.—Another marked deviation from the normal is seen in the basement membrane of the tubules, though it is not as striking a feature in most as are the interstitial cells. This

membrane was thickened in all cases, in some slightly, while in others the lumen was entirely obliterated and the tubule was only represented by a mass of dense, fibrous, and hyaline tissue. Two layers of the membrana propria could be distinguished: an outer fibrous one associated with the intertubular tissue, but distinct from it, which was thin and contained a few wellformed oval nuclei; and an inner hyaline layer. This inner layer was most characteristic and varied greatly in thickness, in many tubules completely obliterating the lumen, while in some specimens in a closely adjacent tubule the membrane was thin and active spermatogenesis was taking place. grades between the two extremes could be found often in the same specimen and even in the same section (Plate II, Fig. 3). This inner layer consisted of an irregular hyaline-like membrane, often thrown into folds, usually showing no nuclei, although occasionally large, ill-defined, degenerated nuclei could be seen having well-marked nucleoli. This same thickening and hyaline change in the basement membrane can be seen in a much less degree in a senile testicle, and also may be caused experimentally in animals as a result of toxic irritation, but never in experimental stenosis of the vas. (Griffiths.21)

Epithelium.—The epithelium lining the tubules showed in all cases examined a marked deviation from the normal. In those tubules where a thickened basement membrane had nearly obliterated the lumen there were no cells, or only a few degenerated ones of irregular shape and having indefinite outlines. In the less extreme cases the tubules were lined with a single, rarely double, layer of similar cells of rather large size, showing no mitoses. The protoplasm was granular in most, and in many showed vacuoles. The nuclei were oval and placed near the base of the cell. These cells probably represent the supporting cells of the testicle or cells of Sartoli. In the normal testicle before puberty the tubules are lined with epithelial cells of a single type. At puberty, however, these become differentiated into the supporting cells and the spermatogenetic cells. In the undescended organ in most of the tubules this differentiation does not take place, and the greater

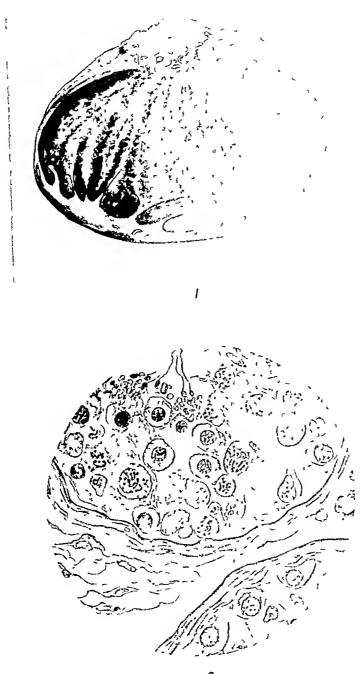
number of cells remain as those of Sartoli, although some tubules often in close proximity to these or even to a completely obliterated one show some spermatogenetic cells. Spermatogonia and spermatocytes can be distinguished in many cases, but the process rarely goes on to completion; and it is in only a few tubules that perfectly formed spermatozoa can be found. In the examination of these nine specimens adult spermatozoa were found in four cases (Cases 44, 47, 52, 70), Case 70 being thirty years of age. One case (Case 71) showed on careful search a few tubules containing spermatogonia, while in the other four (Cases 1, 72, 73, 77) no differentiation could be made out, the epithelial cells being absent altogether or present as Sartoli cells.

Various forms of crystals are sometimes seen, the most discussed of which are the Reinke crystals described by Reinke ²² in 1896. These are fine needle-like crystals seen scattered through the interstitial fibrous tissue in almost every case, and their function has been variously interpreted. According to their discoverer, they play an important part in the formation of the testicle, while the majority regard them either as fœtal remains or products of degeneration.

The following is a brief description of the four specimens from which the plates have been made, illustrating the various types of testicles.

Case 47.—Aged sixteen years. High inguinal testicle. Plate I, Fig. 1. The testicle was two and one-half by two centimetres in diameter, and of normal shape, but of soft consistency. The vas and epididymis were normal and the mesorchium not marked. On section the albuginea was thickened, the lobules were well marked, and there was an increase of the fibrous tissue.

Microscopic examination showed the albuginea thickened and composed roughly of two layers, an outer one of dense fibrous tissue, and an inner one composed of loose tissue which merged into the interlobular fibrous tissue, and contained numerous small vessels. The interlobular fibrous tissue was increased, and contained many small oval nuclei, a few vessels, and some



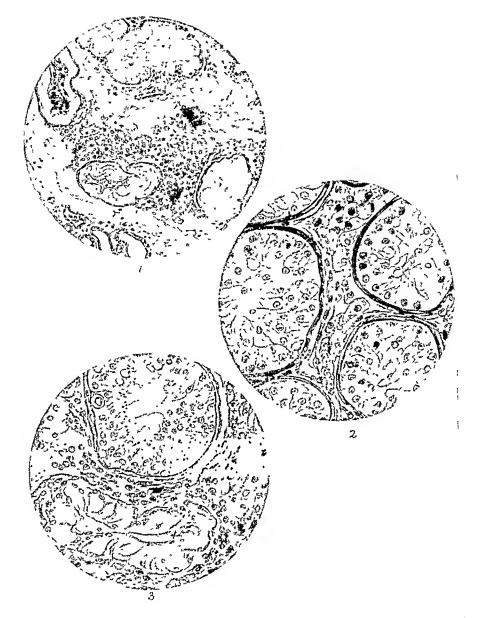


Fig. 1.—Section from Case 73 This shows the more advanced type. The tubules are for the most part represented by masses of hyaline tissue, and where the lumen is present it is filled by detritus and an occasional epithelial cell. The tubules are of irregular shape and widely separated by loose fibrous tissue containing large areas of interstitial cells. Zeiss Comp. Oc. 4. Objective, 8 millimetres.

Fig. 2.—Section from testicle of Case 77. There is no increase in the fibrons tissue, which, however, contains many small areas of interstitial cells. The basement membrane of the tubules is only slightly thickened, but they contain only supporting cells, no spermatogenetic cells being seen in any section. Zeiss Comp. Oc. 4. Objective, 4 millimetres.

FIG 3.—Section from testicle of Case 70. The tubule in the upper part of the field shows some thickening of the basement membrane, but in the lower portion of it active spermatogenesis is taking place, although in the upper part none but supporting cells are seen. The tubule in the lower part of the field is nearly obliterated by the thickening of the basement membrane. The fibrous tissue is increased and contains many interstitial cells. Zeiss Comp. Oc 4. Objective, 4 millimetres.

Reinke's crystals. Some of the lobules were more nearly normal than others, the least change being seen near the capsule. As a rule, the tubules were separated by a considerably increased amount of connective tissue containing many large areas of interstitial cells. The basement membrane of the tubules was thickened, and in most two layers could be distinguished, but in many the change was not marked. In some of the tubules there was no evidence of spermatogenesis; but, although Sartoli cells predominated, spermatocytes, spermatids, and in several fully developed spermatozoa were seen.

Case 70.—Aged thirty years. Position inguinal. Plate II, Fig. 3. The testicle was three by one and one-half centimetres in diameter, soft, and had connected to it by a long mesorchium the epididymis and six centimetres of the vas. Portions of the parietal tunica were closely adherent to it in many places. section the albuginea was thickened, and, although the lobules were not well marked, the tubules "strung out" well.

Microscopic examination showed the tubules widely separated by loose fibrous tissue, in which were masses of interstitial cells and Reinke's crystals. The tubules themselves showed a much thickened basement membrane, which was usually divided into a thin outer fibrous zone, and an inner one, thicker, of hyaline tissue containing no nuclei. The amount of this thickening varied greatly, being scarcely noticeable in some tubules, while in others it obliterated the lumen. Where the membrane was markedly thickened, the tubules were lined with a single very irregular layer of cells with oval nuclei and granular protoplasm, often containing vacuoles. In other places were tubules, which, although showing a somewhat thickened membrana propria. showed active spermatogenesis and contained adult spermatozon. These normal tubules were seen singly and in groups, often being in close apposition to others showing complete obliteration.

Case 73.—Aged twenty-nine years. Position pubic. II, Fig. 1. The testicle was soft, two by one centimetre in diameter, and fastened to the wall of a hernial sac. It was separated from the epididymis, from which a tortuous vas eight centimetres long led off, by a long mesorchium. On section the albuginea was thickened and the organ noticeably fibrous.

Microscopic examination showed the albuginea much thick-

ened. The greater part of the organ was composed of rather

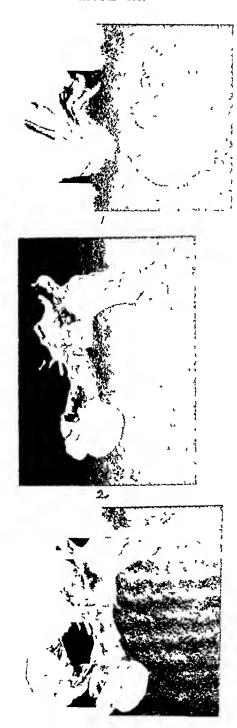
dense fibrous tissue, with many small oval nuclei, and containing large numbers of Reinke's crystals. There were also many interstitial cells, some in groups of three or four, others larger, occupying all of the field under high power. The tubules were scattered irregularly throughout the sections and had no definite arrangement. They presented a thick basement membrane in two layers, the outer being thin and fibrous, the inner thick, in many cases obliterating the lumen and giving the tubules the appearance of a solid hyaline mass. In some this process was not so advanced, and a few degenerated epithelial cells having no structure could be seen lining the tubules.

Case 77.—Aged twenty-three years. Inguinal testicle. Plate II, Fig. 2; Plate III, Figs. 2 and 3. The testicle was three by one and one-half centimetres in diameter and connected to the epididymis, which was imperfectly formed by a lengthened mesorchium. The cord was five centimetres long and not tortuous. On section the tunica was thickened, but otherwise the organ appeared normal.

Microscopic examination showed no marked increase in the interstitial tissue, and the tubules, closely packed together and of normal size, giving the section the appearance, under the low power, of a normal organ. Under high power, the basement membrane was slightly thickened, and in the small amount of interstitial tissue were a few interstitial cells. The most marked change was in the tubular epithelium. This was represented by irregularly placed rounded or oval nuclei lying in faintly-staining granular protoplasm often containing vacuoles. In no tubule was there any evidence of spermatogenesis, and all appeared to be in about the same stage of development.

Complications.—The inflammatory conditions to which the undescended testicle is especially liable have been discussed under symptomatology. There are other forms of acute and chronic inflammations, due either to extension of morbid processes from the urethra, or to constitutional disease. Attacks of simple inflammation, if oft repeated, frequently result in marked atrophy of the testicular substance, the organ becoming a mass of fibrous tissue. An arrested testicle, even if atrophied, is liable to gonorrheal infection from the urethra.

PLATE III.





Case 52.—Twenty years of age. Left inguinal retention. Two days before entrance to hospital, during an attack of gonorrhœa, first noticed pain in left groin, with tender lump. No vomiting. At operation, a small atrophied testicle, acutely inflamed, and surrounded by considerable porky inflammatory tissue, was removed from the canal.

Pathological examination (abstract of report of Dr. J. H. Wright). On section the epididymis was dark red in color, and showed many grayish tubules filled with purulent material. Smears of this stained by Gram's method showed intra- and extracellular Gram-decolorizing diplococci. Cultures on hydrocele agar showed pearly-white colonies, the largest two millimetres in diameter in forty-eight hours, of Gram-decolorizing diplococci. Cultures on plain agar showed no growth. scopic examination showed the larger tubules filled with pus, while the smaller ones were comparatively normal. In some tubules the epithelium was absent, and there were purulent infiltration and disintegration of the surrounding tissues. In many of the cells diplococci like gonococci were present. The interstitial tissue showed marked infiltration with fibrin and leucocytes and other inflammatory cells. The vessels were dilated. The vas showed loss of epithelium and contained pus-cells. There was some infiltration of the cord with inflammatory exudate.

Parotitis has been mentioned as a cause of acute inflammation in undescended testicles. In this series, Case 20 was observed during an attack of mumps, which appeared one week after operation on the testicle, but there was no sympathetic inflammation of either organ. Chronic inflammatory conditions are seen when the testicle is the seat of tubercular or, more rarely, syphilitic infection.

Case 6.—Aged twenty-two years. 1888. Right inguinal retention. One year ago had gonorrhœa and acute epididymitis, followed by swelling in right groin, from which a discharging sinus resulted. At operation, a considerably enlarged testicle was removed from right inguinal canal. Pathological examination showed the testicle and epididymis to be considerably enlarged. On section, in the globus minor were many large pus cavities and cheesy areas separated by fibrous tissue. There were also several small cheesy areas in the testicular substance.

HERNIA.—Inguinal hernia is by far the commonest complication of undescended testicle. The symptoms which it produces are very apt to be the cause of a patient's seeking treatment when, perhaps, his attention is called for the first time to the misplaced organ.

In this series of ninety-two cases, there was some form of hernia in forty-nine, *i.e.*, about 57 per cent. Corner ²⁸ has stated that a hernial sac is to be found in 70 per cent. of the cases. In 49,859 hernias observed at the Hospital for Ruptured and Crippled from 1891–1902, there were 400 cases associated with undescended testicle. The patients ranged in age from four to thirty years. (Coley.²⁴) Eccles, in 48,000 cases of hernia in the male, found 854 imperfectly descended organs.

It is easy to see why hernia so frequently accompanies this deformity, for the processus vaginalis is seldom obliterated, and its descent into the scrotum precedes that of the testicle, being independent of it. Thus, a hernial sac is formed. In inguinal retention the mechanical dilatation of the canal, due to the presence of the testicle, is a predisposing factor. Sometimes, however, the processus is normally obliterated, and the testicle is formed in a separate sac from that of the inguinal hernia. In this series, thirty were recorded as simple inguinal hernia, eighteen as congenital. It is probable that a more careful recording of many of the cases would have shown a larger proportion of the congenital variety.

Inguinal hernia is unquestionably more apt to become strangulated when associated with an arrested testicle. It occurred in ten of the forty-nine cases mentioned above. Sometimes the testicle seems to act as a ball-valve, by slipping into the canal, and thus holding the gut fast in the scrotum.

CASE 65.—Aged twenty-seven years. Right inguinal retention. Had occasionally felt a small tender mass in groin. Entered hospital with large tumor in groin and scrotum; duration, twenty-four hours; marked constitutional symptoms. At operation the scrotum contained a mass of injected bowel and much clear fluid. An atrophied testicle, situated just inside the ring, in the same

sac, was apparently the main factor in preventing the return of the bowel. Testicle was sutured in scrotum and the gut returned.

Rare cases have been reported of monocryptorchids who have had hernia on the opposite side, suggesting the possibility of a defect in the muscular apparatus in the inguinal region. It seems more reasonable to regard them as mere coincidences. In Case 24, in the table, the hernia on the opposite side did not make its appearance until the patient was forty-two years old, and might easily be accounted for by the nature of his work.

Interstitial Hernia.—In this form of inguinal hernia, the sac is forced between the abdominal muscles or between the external oblique muscle and its fascia. It is comparatively rare, but in the male is nearly always associated with some form of cryptorchidism. It occurs in cases where the testicle, perhaps undersized and undeveloped, is situated low in the canal or just at the ring. A hernial protrusion, caused by increased pressure in the abdomen, finds there an obstruction to its course through the ring, and its sac is forced out from the canal between the layers of the abdominal wall, where resistance is less. In this way a large hernial sac may be developed. The hernia is most often found between the fascia covering the external oblique and the muscle itself or its aponeurosis; but it may be found between any two adjacent layers of the abdominal wall.

Case 56.—Twelve years of age. Left testicle had never descended. Had noticed lump in left groin for four or five years; disappeared on lying down. Three days before admission to hospital, a tumor appeared in groin which was irreducible. Examination showed a tense, tender mass, size of lemon, above Poupart's ligament. Impulse on coughing. At operation, the hernial sac was found to be above the ring, between the external oblique and its fascia. It contained the testicle in a congenital sac, with inflamed omentum and some fluid.

In rare cases an interstitial sac may be caused by an ectopic testicle, which carries with it the open processus vagi-

nalis. (Moschcowitz.²⁵) In the same manner, an ectopic testicle situated in the perineum may cause a hernia there.

Hydrocele.—If the funicular process is obliterated, simple hydrocele may occur. Such a condition might easily lead to errors in diagnosis of tumors in the groin. The commonest form is congenital hydrocele, when the open processus allows the exit of fluid from the abdominal cavity, but into which neither bowel nor omentum has protruded.

Torsion of the Spermatic Cord.—Gangrene of the testicle due to twisting of its spermatic cord is of rare occurrence, but as statistics show that in about one-half the cases the testicle is undescended, the condition is worthy of brief consideration. In 47 per cent. of the cases collected by Scudder,²⁶ the testicle was undescended. The precise cause of a rotation of the testicle on its axis is not definitely understood, but in all reported cases some abnormality of the organ has been noted. In fætal life the blood supply comes through a mesenteric fold of peritoneum, the mesorchium, derived from the Wolffian body. The mesentery disappears during the descent of the testicle, and in adult life is represented by that part of the organ uncovered by the tunica vaginalis, where the vessels of the cord enter it.

A persistence of the mesorchium as a true mesentery is one of the causes of non-descent of the testicle, for it hinders the organ from being properly engaged at the internal ring. In most carefully reported cases of torsion, a long mesorchium was found, with a testicle freely movable within its tunica, and its persistence is undoubtedly an etiological factor of importance in torsion. Cabot ²⁷ has reported a case of gangrene due to torsion in which the mesorchium was very short, and tightly wrapped around the twisted cord. Rotation results in shutting off, more or less completely, the blood supply, giving rise to hæmorrhagic infarction and interlobular hæmorrhage with subsequent fibrous change, or to gangrene.

In some instances, acute hæmorrhagic infarction, followed by gangrene, occurs where no twist in the cord has apparently been present. Such cases have been reported by Volkmann (1877) and English, as cited by Scudder, and the following may be classified under this heading.

Case 33.—Aged twenty-one years; single. Right testicle in inguinal canal. For the last three or four years had occasional attacks of pain in right groin with swelling of the arrested organ. Examination showed in the right groin a tense, semifluctuant tumor, size of hen's egg, painful and tender. Impulse on coughing. At operation, testicle found in canal, much increased in size, of purple color. Behind it was a hernial sac filled with clear fluid. There was no twist in the cord. Orchidectomy. The testicle was large and fibrous; and on section there was noted a considerable amount of hæmorrhage in the interstitial tissue. No evidence of spermatogenesis.

Torsion of the cord occurs in the majority of cases in early adult life, and usually follows some excessive muscular exertion or injury in that region. It is noted that the symptoms have frequently appeared immediately following coitus. The symptoms are of sudden onset, often simulating strangulated hernia, but with less constitutional disturbance. Operative interference is always indicated, and orchidectomy is usually necessary. In the cases collected by Scudder there was no mortality.

Case 23.—Aged twenty-seven years; single; a double cryptorchid. For many years had worn a truss for left inguinal hernia. Four days before admission to hospital, the hernia had become irreducible. There was much pain and tenderness, with nausea and some constitutional disturbance. The scrotum was atrophied; right testicle could not be felt. In left inguinal region was a hard, tender tumor the size of a lemon. At operation, a gangrenous testicle was found in the canal, lying in a congenital sac, which also contained a piece of gangrenous omentum. There were two complete twists in the cord. The testicle and omentum were removed.

The question of the blood supply of the testicle is one of considerable interest, as it has an important bearing on

the surgical treatment in many cases. Much experimental work has been done. It is often found, in attempting to transplant an undescended testicle to the base of the scrotum, that the cord is too short. In such cases, the vessels are usually of insufficient length to allow of any lengthening of the cord by traction, while the vas is somewhat tortuous and offers no difficulties to a successful orchidopexy.

The question arises as to whether the vessels can be, in such emergency, divided without serious injury to the testicle. This has been occasionally done by surgeons without other damage than marked atrophy of the organ. After division of the vessels, the vas has been found to be long enough to permit of transplantation of the testicle. A certain amount of stretching incurs no risk.

Mifflet,²⁸ in operations on dogs, arrived at the following conclusions: that obliteration of the spermatic artery was always followed by hæmorrhagic infarction of the testicle, and that obliteration of the veins alone was sufficient to cause a degeneration of the testicular substance. Griffiths,²⁹ in a later series of similar experiments, concludes that after ligation of the spermatic artery there is an immediate diminution in size of the organ and fatty degeneration; later, in rare cases, a portion of the testicle may resume its function. Ligation of the veins leads to great engorgement, followed by gangrene or atrophy. Ligation of both veins and artery leads in most cases to complete wasting. After any of the three procedures, any of the above results may occur.

Torsion of the cord, therefore, may occur without gangrene of the testicle. In fact, it is fair to suppose that mild attacks of orchitis are frequently due to torsion of the cord, in which the blood supply is not seriously impaired.

Malignant Disease.—In a study of the undescended testicle, the question of its liability to become the seat of malignant disease is of great importance.

Thiriar 10 (1887) stated that an arrested testicle was a source of great danger to its possessor, on account of the probability of sarcomatous degeneration. The same opinion

has been held by most authorities on the subject for a century, the early writers being impressed by the frequency of tumor formation. Arnott, in 1848, mentions seven cases; Fischer,³⁰ in 1864, collected thirty-nine cases, and Scymanowski,³¹ Kocher, Spry, Godard, Gowers, Johnson, and von Kahlden ³² have contributed to its literature. Kronpecher ³³ mentioned two cases of sarcoma of both testicles in double cryptorchids, and believed that incomplete descent furnished a strong predisposition. Eccles, on the other hand, from a study of a great number of cases, has recently concluded that no sufficient proof exists for the belief that sarcoma is of more frequent occurrence in imperfectly descended testicles.

In a series of fifty-four cases of malignant disease of the testicle, at the Massachusetts General Hospital, during a period of twenty-six years, six cases were in arrested testicles, *i.e.*, 11 per cent. Schädel, quoted by von Kahlden, reported that in a large London hospital, in one year, forty-one cases of malignant disease were seen, five of which were in undescended testicles, *i.e.*, 12 per cent.

These figures tend to sustain the opinion of the older authorities; and it seems reasonable to believe that sarcoma is of somewhat more frequent occurrence in the ill-developed and abnormally placed testicle. The cause of such predisposition is not clear. Trauma has been suggested, but, as the disease often occurs in cases of abdominal retention, its effects would not seem to be important. It is extremely rare in children; the average age of the six patients reported in the foregoing table was forty years. It is most often noted in inguinal testicles, but is almost as frequently seen in those which have been retained in the abdomen. In the six cases in this table (one double retention), four were inguinal, three were abdominal.

These tumors may attain enormous size. Johnson reported an autopsy where a tumor of the right testicle occupied most of the abdominal cavity, displacing the viscera. The disease is almost invariably fatal, and death usually occurs within a year after the appearance of symptoms. Five of the

six cases reported died within a year. The remaining case lived three years.

It is said that any form of sarcoma may occur. Hansemann has laid stress on the endothelial type, which, he believed, originated in the interstitial cells. Benenati ³⁴ reported a case of rhabdosarcoma of the testicle.

Metastases occur, as a rule, early in the course of the disease. Metastatic growths in the spinal cord are common.

A brief pathological description, based on reports of Dr. W. F. Whitney, of four of the cases in the table is as follows:

Case 26.—Specimen consisted of an oval growth, thirteen centimetres in diameter, covered with a dense, smooth capsule. On section the tumor was composed of soft, grayish-white tissue, opaque, and divided into lobules by dense bands of fibrous tissue. Many large, soft, necrotic areas and several hæmorrhagic cysts. Microscopic examination showed solid masses of large rounded cells, with round nuclei, and a considerable amount of clear protoplasm. The nests of cells were separated by a comparatively small amount of loose fibrous tissue. Large round-celled sarcoma of endothelial type.

Case 28.—Plate IV, Fig. 1. An oval tumor, fifteen by ten centimetres in diameter, resembling a testicle in shape, one portion representing the body of the testicle, covered by a dense, smooth, fibrous capsule, in which were many vessels. On one side corresponding to the epididymis was an opaque, grayish-white lobulated growth. On section, the centre of the tumor consisted of soft, hæmorrhagic, necrotic tissue, while the periphery was slightly denser, homogeneous, and gray in color. The mass had a thin elongated attachment which might be likened to a cord, but which contained nothing corresponding to the vas deferens. Microscopic examination showed growth to be composed of large round cells, many of which were multinuclear, with a little granular intercellular substance. No normal testicular tissue found. Round-celled sarcoma.

Case 36.—At autopsy the left testicle was normal and the vas led normally to the seminal vesicle. The right testicle was not present, but in the right iliac fossa extending to the median line was a tumor mass covered by peritoneum and resting on the





Fig. 1—Sarcoma of the testicle from Case 28. The cord may be seen at the upper portion of the specimen

Fig. 2—Photograph of Case 30—Taken four years after double orchidopexy—Sho vs. vn.) ally good result



muscles which it infiltrated in places. The growth had pushed up between the folds of mesentery and displaced the ureter. It had also infiltrated the wall of the ileum for twelve centimetres above the ileocæcal valve, and was only separated from the lumen of the gut by a thin layer of mucous membrane. From this growth the vas led to a normal seminal vesicle. On section the tumor was extremely soft and extensively necrotic. Around the periphery it was grayish and homogeneous.

Microscopic examination showed masses of large round cells of varying size, separated by considerable intercellular substance, in which were spaces for the passage of blood without distinct walls. Here and there were bundles of smooth muscular fibres probably associated with some of the vascular trunks. The growth was roughly divided into lobules by dense bands of fibrous tissue. In no section was there any normal structure of the testicle. The vas was surrounded by tumor growth. Many of the cells showed mitotic figures. There were metastatic nodules in the portal vein and in a section of the liver. Round-celled sarcoma.

Case 64.—Body of testicle was transformed into a tumor mass, nine centimetres in diameter, which on section was soft and opaque, and with a marked tendency to hæmorrhagic necrosis. Along the edge was a narrow zone of firmer grayish tissue, and in the connective tissue was a similar growth, in the midst of which were bright yellow necrotic areas.

Microscopic examination showed large round cells, separated by fibrillar intercellular substance, uniting with connective tissue. There was such extensive necrosis that only in a few areas could a cellular condition be made out. No normal structure of the testicle was found. No tumor growth detected at upper end of the cord. Large round-celled sarcoma.

TREATMENT.—The treatment of undescended testicle varies according to the age of the patient, the presence or absence of complications, and the severity of symptoms in a given case. A consideration of the age of the patient is of the utmost importance, for the treatment is essentially different in infancy, youth, and adult life.

Uncomplicated Cases without Symptoms.—As has been

shown, it is not unusual for infants at birth, and for some time thereafter, to have partially descended testicles on one or both sides. This condition is of no special importance, for the chances are very great that the organ will descend to the scrotum during the first few months. The failure of descent in no way affects the health, vitality, or development of the infant at this age, and no treatment with a view to correcting the deformity is of avail. The condition should be noted, nothing more.

During childhood the failure of descent of the testicle assumes greater importance, for the longer the condition persists, the smaller becomes the chance of its descending spontaneously. Nevertheless, until a late period in childhood is reached, the condition is of no greater importance than in infancy, except for the above reason. Children with one or even both testicles imperfectly descended, up to the age of ten or eleven years, show no abnormality referable to the defect. If, however, a child reaches the age of eleven or twelve, and the undescended organ still shows no tendency to progress to the scrotum, the condition should be regarded in a different light. The chance of its descending after this age is very small; also the age of puberty is approaching, at which time the testicle is to assume new functions, unless prevented from so doing by a faulty position. The period of childhood from eleven or twelve years to puberty is of great importance, for it is during this period that operations for transplanting the testicle to the scrotum are most frequently attended with good results, both as regards the ultimate location of the organ and its integrity.

In many of these cases the testicle by manipulation can be withdrawn from the canal and placed in the scrotum. If this is possible, gentle massage and traction should be tried daily, and in some cases such measures have apparently aided the testicle in its descent.

If a testicle is allowed to remain in an abnormal position during the period of puberty, there is good reason to believe that it will not undergo the changes incident to puberty, and will probably remain functionless. It is rare for a surgeon to be called to treat an adult with undescended testicle with which there are no complications or symptoms caused by the deformity. The condition is usually noted and advice sought by the parents during childhood.

Uncomplicated Cases with Symptoms referable to the Testicle.—It is unusual for children under ten years of age to suffer from attacks of pain in the region of the misplaced organ unless there is a history of direct trauma. The testicle is small, usually freely movable, and lacks much of the peculiar testicular sensitiveness of later life. Operative treatment is rarely called for at this age for the relief of symptoms, unless the attacks of pain and swelling are severe, and are liable to impair the function of the testicle. Towards puberty the organ becomes more sensitive and there is a greater liability to pain. In adult life, pain and inflammation are of commoner occurrence, and relief by surgical treatment is often sought. It becomes then a question of the choice of operative procedure, the results of which are discussed later.

Cases with Complications.—By far the commonest is some form of hernia. If this exists, operation is to be advised considerably earlier in life than in simple cases. (Tuffier.) Operation consists in locating the testicle and treating it according to the existing condition as in uncomplicated cases, and in performing a radical cure of hernia. The treatment in cases with which other complications than hernia are associated has been described.

No child with double undescended testicle should be allowed to reach the age of puberty without an effort being made by operation to bring the organs to their normal position, for if the deformity is disregarded the individual will probably be sterile throughout life. It has been claimed that double arrest of the testicle is liable to interfere with the normal development at puberty, but it seems as if this rarely, if ever, occurs. Such influence as the testicles exert at puberty on the bodily development is probably not modified by the position of the organs. Although the function of spermatogenesis may

not be established, yet that other physiological influence, claimed by many to be due to an internal secretion of the gland, is present.

If the deformity is single, although good surgery demands an attempt at its correction being made, the importance of such a procedure is lessened, for the individual can maintain all functions with a single properly descended testicle. In operations on children, both organs should not be placed in the abdominal cavity, for such testicles are invariably functionless; and in no case, single or double in children, should orchidectomy be done, unless the testicle is hopelessly degenerated. In adults, with double arrest, if an attempt at orchidopexy is unsuccessful, the organs may be returned to the abdominal cavity. Orchidectomy should be done only as a last resort, and castration is never justifiable. No treatment is to be advised for abdominal retention.

The operations may be divided into three groups: (1) Orchidectomy; (2) Orchidopexy; (3) Replacement in abdomen. The choice is in all cases governed by the age of the patient and the condition and position of the organ as found at operation. If there is marked atrophy, and the other testicle is unquestionably normal in every respect, orchidectomy is the operation of choice, especially if there is a complicating hernia, for the testicle is functionless, and the removal of the cord makes it easier to close the canal, and thus prevent a recurrence of the hernia. Orchidopexy is the operation of choice in children; and in adults attempts should be made in most cases to lower the position of the testicle before orchidectomy or other measures are resorted to.

TECHNIQUE.—The inguinal canal is opened, as in the Bassini operation for hernia, thus exposing the testicle and spermatic cord. The cord is dissected free, and considerable traction exerted on it without incurring any danger. If little or nothing is gained by this procedure the vas should be dissected free. It is usually found to be very tortuous, and may extend in a loop below the testicle itself. The shortness of the cord is seldom due to the vas, but rather to the blood-vessels

which accompany it. Some operators advise a division of all but the vas, which allows the testicle to be brought to the scrotum with ease; in these cases the artery of the vas probably supplies the testicle through its anastomoses. This seems to be an unwarrantably radical proceeding, and while it has undoubtedly been successful in some cases, yet it is a well-known fact that in operations for varicocele, when only a part of the vessels are divided, gangrene of the testicle may supervene. The experiments on the blood-vessels, cited above, are of interest in this connection. If, as is rarely the case, the vas is that portion of the cord which prevents its being lengthened, the epididymis may be partially dissected free from the testicle, and the organ inverted.

If there has been a failure of closure of the processus vaginalis, and a congenital sac exists, the sac should be divided, its upper portion being disposed of by suture of the neck and excision, while its lower portion can be folded and stitched around the testicle, making a tunica vaginalis. The canal is closed as in the Bassini operation, the cord being fixed at the external ring by a stitch which fastens it to the aponeurosis of the external oblique. This stitch should be placed while traction is maintained on the cord. (Tuffier.³⁵)

As the side of the scrotum corresponding to the undescended testicle has never been distended, it should be filled out with a mass of gauze early in the operation, which puts it on the stretch and forms a cavity for the reception of the testicle

The testicle is held in the scrotum by suture of the tunica albuginea to the subcutaneous tissue of the scrotum, or it may be allowed to lie in its position without suture, held in place by a suitable bandage. Even when the greatest care is taken to anchor the organ at the base of the scrotum, there is almost invariably a marked tendency to retraction upward. The scrotum, especially if undeveloped, exerts little influence in holding the testicle down. This retraction may be apparent soon after the operation, or may be slow in making its appearance, the testicle gradually working its way upward for months after its transplantation.

An operation has been described by Katzenstein ³⁶ in which the testicle is withdrawn from an opening in the base of the atrophied scrotum and sutured to the inner side of a pedunculated flap of skin dissected up from the inner side of the thigh. This flap is later cut off and made to form a new base to the scrotum.

When, in adults, orchidopexy is found to be impossible, and it is deemed best not to remove the testicle, it may be replaced in the abdominal cavity, and the canal closed tight by suture. This procedure renders the organ functionless, and is liable to be followed by a recurrence of the trouble, for the testicle may find its way again, after the lapse of some time, into the inguinal canal. (Case 20.)

RESULTS OF OPERATION.—In considering the value of the operation as to end results, attention should be paid to the ultimate position of the testicle, its size, and probable functionating powers, and the relief or aggravation of symptoms. No attempt has been made to tabulate the end results in cases treated by orchidectomy.

Orchidopexy.—If the aim of the surgeon is merely to draw down the testicle sufficiently to fix it outside the external ring, his effort is almost invariably attended with success. Most testicles, lying in the canal, can be brought down by traction or otherwise into such a position. This allows a tight closure of the canal, and thus prevents the likelihood of a recurrence of a complicating hernia. Many believe that the testicle should be spared even if much atrophied, on account of its supposed value in the economy. On the other hand, many operators are not satisfied with such a result, believing that an organ so placed is in a position likely to cause much discomfort, and, being undoubtedly functionless, is much better removed.

Brocha ³⁷ operated on 138 cases. Seventy-nine were followed for one year; thirty-one of these were normal in size and position; thirty-five were normal in size, but situated high in the scrotum; thirteen were atrophied. All of these cases, however, were in young children; and Keyes, ³⁸ commenting on the series, says that no such results could have been obtained in adults

Coley operated on thirty-eight patients, of whom twenty-seven were children, and all were under thirty years of age. In only two of these cases did he find it best to remove the testicle.

Tuffier ³⁹ reported a series of twenty-five cases in which orchidopexy was done in twenty-three. The end result is not known.

The literature abounds in reports of single cases in which orchidopexy was satisfactorily performed; but the end result of such cases is difficult to ascertain.

In the following table, there were twenty-four orchidopexies done on twenty-two patients, two having double retention. The end result in eighteen of these cases is known. Seven of these were under fourteen years of age.

DETAILED RESULTS OF ORCHIDOPEXIES.

Case 11.—1893. Aged twenty years. Right testicle at internal ring; inguinal hernia; pain for several years. Sutured into scrotum, the cremaster being divided and globus minor dissected off testicle. Bassini for hernia. Eleven years later, organ much atrophied in extreme upper part of scrotum. Until two years ago had much pain. No recurrence of hernia.

Case 16.—1894. Aged five years. Right inguinal retention. Symptoms for three weeks following trauma. Sutured in scrotum with fine silk. Inguinal hernia, not congenital; Bassini operation. Ten years later, testicle vaguely felt in canal, very much atrophied. Scrotum atrophied. No symptoms; no recurrence of hernia.

CASE 24.—1897. Aged forty-two years. Left inguinal retention; right inguinal hernia; pain on left side after exertion. Testicle sutured in scrotum; Bassini on right. Six and one-half years later, left testicle situated one and one-half inches below external ring, in scrotum. Very much atrophied, about one-sixth normal size. No symptoms.

Case 30.—(See Plate IV, Fig. 2.) 1899. Aged thirteen years. Left testicle felt over external ring, normal in size. Right testicle not felt (abdominal). Scrotum atrophied. No symptoms. Left testicle freed and sutured in scrotum. One year

later, left testicle in scrotum. Right testicle felt under skin above external ring. Dull pain in right groin for six months. Right testicle found subcutaneous, easily sutured into scrotum. Open processus vaginalis, closed; Bassini.

Four years after second operation, left testicle normal in size and position, freely movable; congenital hydrocele present. Right testicle normal in size and position, freely movable. Scrotum and penis well developed. No symptoms.

CASE 32.—1899. Aged eleven years. Left inguinal retention with inguinal hernia. No symptoms. Testicle sutured in scrotum. Bassini.

Four years later, testicle much atrophied, immovable at external ring, very tender, and frequently inflamed. Scrotum atrophied. No recurrence of hernia.

CASE 37.—1900. Aged twenty-six years. Double inguinal retention and double inguinal hernia. Pain, most noticeable on right side. Both testicles found small and atrophied, but sutured into scrotum with difficulty, owing to shortness of the cords; Bassini. Three weeks later both testicles retracted into the external rings. Three and one-half years later both testicles felt in canals, very small. Scrotum atrophied. No recurrence of hernia. Patient strong and athletic; has normal intercourse. Unmarried.

Case 49.—1901. Aged sixteen years. Right inguinal retention. Pain for a few months. Testicle sutured into scrotum. Two and one-half years later testicle about one-fifth normal size, very high in scrotum. No symptoms.

CASE 50.—1901. Aged twenty-one years. Left inguinal retention with inguinal hernia. Attacks of pain and swelling for ten years. Testicle sutured to base of scrotum, the spermatic vessels being divided; Bassini. Two and one-half years later testicle about one-half normal size in upper part of scrotum. No symptoms; no recurrence of hernia.

Case 55.—1901. Aged twenty years. Left inguinal retention. Painful swelling for three months. Testicle sutured in scrotum without difficulty. At end of operation it was one and one-half inches below external ring. Two years later testicle one-half normal size, situated slightly higher than right, in fair position. Organ causes much pain, due to frequent injury.

Case 60.—1902. Aged twenty-four years. Left inguinal retention with congenital hernia. No symptoms. At operation

testicle appeared normal, sutured in scrotum; Bassini. Thirteen months later testicle retracted to pubes. Has some pain. No return of hernia.

Case 62.—1902. Aged nineteen years. Right testicle at external ring. Inguinal hernia. Attacks of pain for two years. Testicle found normal in size, in congenital sac. Cord short. Sutured with difficulty in scrotum. Three weeks later, retracted to level of root of penis. Thirteen months later, testicle in canal, much atrophied, causing pain most of the time. Scrotum on right entirely atrophied. No return of hernia.

Case 63.—1903. Aged thirteen years. Left inguinal retention with congenital hernia. No symptoms. Sutured in scrotum; Bassini. One year later, testicle situated high in scrotum; no symptoms; no return of hernia.

Case 66.—1903. Aged twenty-eight years. Right inguinal retention and congenital hydrocele. Pain in groin. Testicle sutured in scrotum; Bassini. Nine months later, testicle one-fifth normal size, just outside external ring. Pain continues. Scrotum atrophied. No return of hernia. Sexual neurasthenic.

Case 68.—1903. Aged thirteen years. Right inguinal retention with congenital hydrocele sac. Attacks of severe pain for two years. Sutured into scrotum. Three weeks later was one inch below ring. Nine months later testicle in extreme upper part of scrotum. Slight pain at times.

CASE 69.—1903. Aged five years. Right inguinal retention with inguinal hernia. Considerable pain at times. Sutured in scrotum; Bassini. Nine months later, testicle just outside ring; no return of hernia; no pain.

CASE 75.—1903. Aged twenty-two years. Double inguinal retention with strangulated hernia on left side. Symptoms due to hernia. Bowel returned to abdomen; Bassini. Left testicle very small, held just outside ring by close suture of external oblique aponeurosis. Three weeks later, testicle in same position: no symptoms.

Summary.—Orchidopexy was performed seven times in children ranging in age from five to thirteen years. In but two instances was a perfect result obtained, and this in the same patient, aged thirteen, who had double retention. Both testicles are normal in size, position, and probably in function-

ating power. Two other boys were operated on at the same age, thirteen; and in both the testicles have remained in the scrotum. Although they have retracted to a position high in the scrotum, they are not in contact with the pubic bone. Neither testicle is notably atrophied. One of the patients suffers some pain. One case, aged eleven, has a poor result, the testicle being much atrophied and fixed firmly just outside the ring, where it is a constant source of pain, and would better be removed. Two children were five years old at operation. In one the testicle drew up into the canal, where it remains, very small and undeveloped; in the other, it retracted to the pubic region, where it has, as yet, given no trouble. The only really satisfactory results were in the four cases aged thirteen.

As a result of the eleven operations performed in adults from sixteen to forty-two years of age, five testicles have remained in the scrotum, four of them occupying a high position in it, while the remaining one is in almost perfect position, and fully one-half normal size, yet is the seat of frequent inflammatory attacks due to injury. Three testicles retracted soon after operation into the canals, where they remain, very much atrophied. One of them is the cause of much pain. Two have retracted to the pubic region, where they are the source of considerable annoyance, undoubtedly due to their position. One of these is atrophied.

In every case in which the organ appeared normal at the time of operation, there has been a subsequent diminution in size: in two cases, however, the atrophy is not very marked, the testicle being fully one-half normal size.

In two cases symptoms were distinctly relieved, in three not relieved, and in two others were aggravated.

In no case has there been a recurrence of a complicating hernia.

RESULTS OF CASES IN WHICH TESTICLE WAS REPLACED IN THE ABDOMINAL CAVITY.

CASE 20.—1895. Aged fourteen years. Double inguinal retention. Painful tumor in each groin. At operation, left testicle was placed in abdomen, as cord was very short.

Examination eight years later. Left testicle vaguely felt in canal. Right testicle, very small, situated at external ring. Wears truss, as much pain results if testicles are allowed to emerge from the rings. Patient is married and has one child.

CASE 39.—1900. Aged nine years. Left inguinal retention with congenital hernial sac. Pain for a year following trauma. Testicle placed in abdomen. Three and one-half years later, left side of scrotum atrophied. No symptoms; no return of hernia. Testicle not felt. Testicular sense on deep pressure in left iliac region.

Case 43.—1900. Aged twenty-one years. Left inguinal retention with congenital hernial sac. No symptoms. Small atrophied testicle placed in abdomen. Three and one-half years later, no symptoms, no return of hernia. Testicle not felt; had not reentered canal.

Case 45.—1900. Aged twenty-five years. Right inguinal retention with incarcerated congenital hernia. No symptoms referable to testicle. Operation for hernia; testicle returned to abdomen. Three years later, no symptoms. Testicle could not be felt; no recurrence of hernia.

CASE 74.—1903. Aged twenty years. Double inguinal retention. Pain for two years. Both testicles returned to abdomen.

Six months later, no symptoms; neither testicle to be felt.

REFERENCES.

- ¹ Hunter. Medical Commentaries, 1762, Vol. i; Treatise on Animal Economy, 1786.
- ² Lecompte. Thesis of Paris, 1851.
- Arnott. Medico-Chirurgical Transactions, 1848, Vol. xxx, p. 9.
- Gowers. London Medical Gazette, 1849, Vol. xxxix, p. 101.
- ⁶ Spry. Lancet, 1857, Vol. ii, p. 824.
- Johnson. Medico-Chirurgical Transactions, 1859, Vol. xlii, p. 15.
- Godard. Le Monorchordie, Paris, 1857.
- ⁸ Curling. Diseases of the Testicle, London, 1866.
- ^o Eccles. London Lancet, Vol. clxii, pp. 569, 722.
- ¹⁰ Tuffier. Gazette des Hôpitaux, 1890, p. 349.
- "Christopherson. British Medical Journal, February 7, 1903.
- ¹² Lane. British Medical Journal, 1894, Vol. ii, p. 1241.
- ¹⁸ Göbell. Münch. med. Woch., 1901, p. 53.
- Griffiths. Journal of Anatomy and Physiology, 1893, Vol. xxvii, p. 483.
- Monod et Arthaud. Archiv Gén. de Méd., 1887, Vol. ii, p. 641.
- ¹⁶ Bellingham-Smith. Lancet, 1899, Vol. ii, p. 785.

TABLE OF CASES.

_													
	Remarks.	Death; meningitis. Plate III,	Death in one year. Left testicle descended at five years		Died in hospital.	Tuberculosis of tes- M. H. Richardson. Pathological Report. (William F.	w mmey.)	Hernia reduced; ether. Died,	Examined December, 1903. Operation for hernia. Death.	Operation for hernia. Operation for hernia reported De-	cember, 1903. Right testicle seen at appendec-	Examined December 1903. Hernia reduced; ether. Exam-	ned December, 1903. Death in hospital; autopsy.
	Service of	G. G. Tarbell.	C. B. Porter. M. H. Richardson.	A. T. Cabot.	H. H. A. Beach.	M. H. Richardson.	J. Homans.	A. T. Cabot. A. T. Cabot.	A. T. Cabot. J. Homans. J. C. Warren.	J. C. Warren. J. C. Warren.	H. H. A. Beach.	S. J. Mixter. H. H. A. Beach. H. H. A. Beach.	F. C. Shattuck.
	Complications.	0	Sarcoma. Inguinal hernia.	0	Strangulated inguinal H. H. A. Beach.	Tuberculosis of tes-	Double inguinal her-	Inguinal hernia. Inguinal hernia.	Inguinal hernia. Inguinal hernia. Strangulated congen-	nal nemia. Inguinal hernia. Inguinal hernia.	0 (Inguinal hernia. Inguinal hernia. Strangulated ingui-	R. sarcoma.
	Operation.	0	00	Relieved by ma-	nipulation. For strangulated	Orchidectomy.	R. orchidectomy. L. orchidectomy.	Orchidectomy.	Orchidectomy. Orchidopexy. o		r. . o	Crchidopexy.	R. 0
	Position.	Pubic.	Abdominal. Pubic.	Pubic.	Pubic.	Inguinal.	bic. sbcutane-	ous. Pubic. Inguinal.	Pubic. Inguinal. Pubic.	Puboscrotal. Pubic.	R. abdominal.	L. abuominal. Inguinal. Inguinal. Inguinal.	R. inguinal. L. inguinal.
	Side.	R.	그전	Α.	Ж.	ж	Double.	ಜೆಜೆ	际院民	ப்ப்	Double.	ጜጜጜ	Double.
	Date.	1877	1879 1886	1887	1888	1888	1889	1890 1892	1892 1893 1894	1894 1894	1894	1894 1894 1895	1895
	Age.	33	46 14	21	30	22	48	23	23 20	18	37	33	46
	No.	-	9 00	4	S	9	7	∞ <i>o</i>	11 21	13	15	16 17 18	19

				τ	JNI	DESC	CEND	ED	TE	STIC	LE.			1001
Parotitis. Examined December,				Operation for hernia on right. Examined December. 1003.	Operation for hernia, Examined	Death, January, 1902. Recurrence. Specimen.		Death in one year. Recurrence.	9, 6, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5,	Left operated, 1899; right, one year later. Plate IV, Fig. 2.	Examined December, 1903. Pathological Report. (William F.	Walthey.) Died, 1902. Tuberculosis.	Died two months later. Recur-	Examined December, 1903.
S. J. Mixter.	S. J. Mixter. A. T. Cabot.	I. W. Elliot.		F. B. Harrington.	J. Homans.	C. B. Porter.	S. J. Mixter.	J. Homans.	C. B. Porter.	J. Homans. A. T. Cabot.	J. W. Elliot. C. B. Porter. C. B. Porter.	H. H. A. Beach. C. B. Porter.	Private case.	M. H. Richardson.
0	Periorchitis.	· · · · ·	L. congenital ingui- nal hernia, torsion	of cord. R. inguinal hernia.	Inguinal hernia.	Sarcoma.	R. o L. congenital ingui-	Sarcoma.	Strangulated congen-	R. o L. congenital hydro-	Inguinal hernia.	o Congenital hydro-	Sarcoma.	Double inguinal her- nia.
R. 0	L. put in abdomen. Put in abdomen. R	: :	L. orchidectomy.	Orchidopexy.	0	Orchidectomy.	R. o L. orchidopexy.	Orchidectomy.	Orchidectomy.	R. orchidopexy. L. orchidopexy.	Orchidopexy. Orchidopexy. Orchidoctomy.	Orchidectomy. Orchidopexy.	Orchidectomy.	R. orchidopexy. L. orchidopexy.
	L. inguinal. Inguinal. R. mibic	rotal.	L. inguinal.	Pubic.	Abdoniinal.	Inguinal.	Double. R. abdominal. L. inguinal.	Abdominal.	Puboscrotal.	Double. R. abdominal. L. inguinal.	Pubic. Inguinal. Inguinal.	Abdominal. Pubic.	Abdominal.	Double. R. inguinal. L. inguinal.
Double.	R.	Double.		j	ьi		Double.	'n	j	Double.	작가장	22 22	æ' 	Double.
1895	1895			1897	1898	1898	1898	1898	1899	1899	1899 1899 1899	1899	1900	1900
14	24	4 6	ì	24	21	49	0	33	19	13	212	23	46	92
20	77	3 6	?	24	25	92	27	28	29	30	332	35	36	33

TABLE OF CASES.—Continued.

Remarks.		Examined December, 1903.		M. H. Richardson.	M. H. Richardson. Operation for acute appendicitis. F. B. Harrington. Operation for hernia. Reported	December, 1903.	Specimen. Keported December, 1903.	Examined December, 1903. Specimen. Plate I, Fig. 1.		Examined December, 1903. Examined December, 1903.	Specimen. Pathological report. (J. H.	Wright.)	***************************************	Examined December, 1903.
Service of	inguinal A. T. Cabot.	F. B. Harrington.	A. T. Cabot.	M. H. Richardson.	M. H. Richardson.)	C. B. Porter. H. H. A. Beach.	ıch.	<u>•</u>	J. W. Elliot.		inguinal S. J. Mixter.		•
Complications.	Congenital inguinal	Congenital inguinal	R. inguinal hernia.	R. inguinal hernia.			<u></u>	Inguinal hernia. Strangulated fromits of 1 W. Tu. A. Ber J. C. Warren.	hernia.		al hernia. hœal epididy-	tal inguinal	Strangulated inguinal S. J. Mixter.	Congenital hydrocele. C. B. Porter. Strangulated congen- ital interstitial her- nia.
Operation.	Orchidectomy.	Put in abdomen.	R. orchidectomy.	i & -	L. O O Put in abdomen.		Orchidectomy. Put in abdomen.	o Orchidectomy.	commenday.	Orchidopexy. Orchidopexy.	Orchidectomy.	Orchidectomy.	Orchidopexy.	Orchidopexy. Orchidectomy.
Position.	Inguinal.	Abdominal.		1	Abdominal. Inguinal.		Inguinal. Inguinal.	Inguinal. Abdominal. Inguinal.		Inguinal. Pubic	Inguinal.	Inguinal.	Pubic.	Inguinal. Pubic.
Side.	ľ.	្រ	Double.	Double.	ᅜᅜ		그룹	ಷಗಷ		zi Li b		ij		ដ្ឋ
Date.	1900	1900	1900	1900	1900		1900	1900		1991	1901	1061	1991	1901
Age.	27	6	11	א	11		16 25	16	, ,	21	2 2	I	37	20
No.	38	39	40	41	4 5		4.5	64 44 84	. :	\$ 8 7	52	53	54	55

					U	IDN	ESC	ENDE	D 7	res	TIC	LE.				1003
Examined December, 1903.		Examined December, 1002.		Examined December, 1903.	Reported December, 1903.	Died one year later. Recurrence.	Specimen.	Examined December, 1903.	Reported December, 1903.	Specimen. Plate II, Fig. 3.	Specimen.	Specimen. Flate II, Fig. I.	Reported July, 1904.	Examined.		Specimen. Plate I, Figs. 2 and 3; Plate II, Fig. 3.
W. M. Conant.	F. B. Harrington. W. M. Conant.	S. J. Mixter.	H H A Reach	inguinal J. C. Warren.	inguinal C. B. Porter.	H. H. A. Beach.	ingui- J. W. Elliot.	A. T. Cabot. A. T. Cabot.	J. W. Elliot.	C. L. Scudder.	Private case.	Private case.	H. Williams. A. T. Cabot.	F. B. Harrington.	J. W. Elliot.	A. T. Cabot.
0	Inguinal hernia. R. inguinal hernia.	L. o Congenital inguinal S. J. Mixter.	hemia.	Congenital inguinal	E	Sarcoma.	Strangulated ingui-	Congenital hydrocele. A. T. Cabot. Congenital inguinal A. T. Cabot. herrin	Congenital hydrocele, J. W. Elliot.	Congenital hernia.	Inguinal hernia.	hernia.		R. o R. I. stranmlafed con-	genital hernia. Congenital inguinal J. W. Elliot.	nemia.
T		L. orchidopexy. Orchidopexy.	o	Orchidopexy.	Orchidopexy.	Orchidectomy.	Orchidopexy.	Orchidopexy. Orchidectomy.	Orchidopexy.	Orchidectomy.	Orchidectomy.		R. put in abdomen. R.	R. o L. orchidopexy.	Orchidopexy.	Orchidectomy.
R. abdominal. R. L. abdominal. L.	Puboscrotal. R. inguinal.	L. inguinal. Inguinal.	Inguinal.	Pubic.	Inguinal.	Inguinal.	Inguinal.	Inguinal. Inguinal.	Inguinal. Inguinal.	Inguinal. Inguinal.	Inguinal. Pubic.		R. inguinal. I inguinal.	R. inguinal.	Inguinal.	Inguinal.
Double.	L. Double.	نہ	Ж.	~	ند	남	۳. ۳.	2.5.	ĸ ĸ	~ ~ .:	Z.1.		Double.	Double.	ı	± 1
1902	1902	1902	1902	1902	1902	1902	1903	1903	1903	1903	1903		1903	1903	1061	toú
71	∞ <i>۲</i> -	24	*	19	13	24	27	18	E z	ಜ್ಞ ಭ	39		ő	22	77	~

59 60 60 60 64 67 67 77 73 74 75

- ¹⁷ Branca and Felizet. Jour. de l'Anat. et de la Phys., 1898, p. 589.
- ¹⁸ Bezançon. Gaz. Méd. de Paris, May 14, 1902.
- ¹⁰ Launois. Ann. des mal. des organs genito-urinaires, October, 1894.
- ²⁰ Hansemann. Archives of Pathological Anatomy, 1895, Vol. cxlii, p. 3.
- ²¹ Griffiths. Journal of Anatomy and Physiology, 1893, Vol. xxvii, p. 474.
- ²² Reinke. Arch. f. mikr. Anat., 1896, p. 34.
- 28 Corner. British Medical Journal, June 4, 1904.
- 24 Coley. Annals of Surgery, June, 1903.
- 25 Moschcowitz. New York Medical Record, 1903, Vol. lxiii, p. 62.
- ²⁶ Scudder. Annals of Surgery, 1901, Vol. xxxiv, p. 234.
- ²⁷ Cabot. Boston Medical and Surgical Journal, June 25, 1903.
- ²⁸ Miflet. Langenbecks Arch., Band xxiv, p. 23; Arch. f. Clin. Chir., 1879, Band xxiv, p. 399.
- ²⁹ Griffiths. Journal of Anatomy and Physiology, 1895, Vol. xxx, p. 81.
- 30 Fischer. Zeitsch. f. pract. Heilkunde u. Med., 1864, Band i, p. 35.
- 31 Scymanowski. Prager Vierteljahresschrift, 1864.
- ³² V. Kahlden. Münch. med. Wochen., 1887, p. 589.
- 33 Kronpecher. Virchow's Arch., 1898, No. 151.
- 34 Benenati. Virch. Arch., 1903, Vol. clxxi, p. 418.
- 50 Tuffier. Bull. et mem. Soc. de Chir., 1893, p. 182.
- ²⁶ Katzenstein. Deutsch. med. Wochen., 1902, Vol. xxviii, p. 937.
- ⁸⁷ Broca. Gaz. Hebdom., 1899, Vol. iv, p. 289.
- 58 Keyes. Genito-Urinary Diseases, 1904.
- 50 Tuffier. Bull. et mem. Soc. de Chir., 1893, p. 182.





Fig. 1.--Hypernephroma. Showing the external appearance of the kidney and tumor about one-third smaller than at the time of operation.

I. HYPERNEPHROMA OF KIDNEY. II. FIBRO-ADE-NOMA OF INNER WALL OF ILEUM.

A CLINICAL REPORT.

BY FRANCIS S. WATSON, M.D.,

OF BOSTON, MASS.,

Surgeon to the Boston City Hospital.

Case I.—Hypernephroma of Kidney; Nephrectomy; Recovery; Death Fourteen Months Later, thought to be Due to Cerebral Embolism; No Clinical Evidence of Recurrence Prior to Death; Autopsy refused.

A woman aged fifty-two years, in robust health until six months prior to May, 1903. Family history has no bearing on the case. Duration of symptoms, six months. The first noticed were bladder irritability and increased frequency of urination, soon followed by a sense of weight and dragging beneath the right lobe of the liver. Gastric disturbances soon becoming marked, loss of appetite, occasional nausea, and gastralgia gradually supervened, and associated with them were progressive pallor and loss of weight, the latter twenty-five pounds in the course of the six months.

Four months previous to being seen by the writer, she had for the first time an attack of hæmaturia associated with sharp lumbar (renal?) pain radiating to the bladder. The pain and the blood in the urine continued in this attack for twenty-four hours. For the following six weeks there was more or less dull pain in the region of the right kidney and radiating downward to the bladder.

She first entered the Boston City Hospital in April, 1903, in the service of my colleague, Dr. George G. Sears, through whose courtesy I have been furnished with the results of the physical examination made at that time, of which the following are the more important features:

Physical Examination, April 15, 1903.—Skin shows similar discoloration to that seen in Addison's disease. Examination of all organs other than the following was negative.

Heart.—Systolic murmur at apex propagated to axilla was the only abnormal thing found.

Abdomen.—A large tumor is present in the right upper, lateral, and anterior aspects of the abdomen. It appeared to be identified with a kidney. It extended from the lower border of the last rib behind and above, downward and forward to a point midway between the umbilicus and the crest of the ilium, and in front nearly to the mammary line.

Urine.—Pale, acid; specific gravity, 1016. A considerable sediment, consisting of pus, renal and bladder epithelium. There was a slight trace of albumen in the intervals of the attacks of hæmaturia when there was no blood present in the urine.

Blood.—White count, 6200; red, 2,700,000; hæmoglobin, 25 per cent. During the ensuing interval of four weeks or so before the writer saw the patient in consultation with Dr. Sears and her transfer to the surgical side of the hospital, there was three further attacks of hæmaturia, one of which was of considerable severity, and the patient continued to slowly lose ground.

Operation.—Ether anæsthesia, May 27, 1903. The tumor was exposed by a five-inch incision made through the right linea semilunaris, and was seen to have its seat in the kidney. The growth was laid bare by incising the overlying peritoneum, and the field of operation was excluded from the general peritoneal cavity by suturing the edges of this incision to the outer wound in order that the removal of the kidney should be conducted extraperitoneally. It was found necessary later to prolong the first incision, which was done by a transverse cut extending from the upper end of the former to the edge of the quadratus lumborum. The kidney and tumor formed a mass about one-third larger than shown in the accompanying illustrations. (Figs. I and 2.) There were numerous but not dense adhesions between the renal capsule and the perinephritic tissues. The capsule was moderately thickened. The ureter and the vessels were ligated separately, divided, and the kidney removed. The ureter was ligated low down below the iliac vessels because of the suspicion that the growth involved it. The temporary sutures attaching the margins of the peritoneal incision were removed, and the latter was closed above the space made by the removal of the



		•				
		•				
				-		
	/ 1					
•						
		•				
			•			
				•		
•						
	•					
						•
					•	
				•		

kidney, and the outer wound closed except for a small part which was left open posteriorly for drainage.

Subsequent Course.—The patient bore the operation well. The subsequent course of convalescence was uninterrupted, except by the formation of a small superficial abscess occurring seven days after operation, and by the persistence of a very small sinus, which occasionally opened during the ensuing four or five months.

Urine.—In the first twenty-four hours the quantity passed was thirteen ounces. It was cloudy and concentrated, and contained a slight amount of microscopic blood. From third day the daily quantities were about thirty-five ounces, and at the end of the sixth week there were no longer any abnormal elements in the urine. Urea averaged about 1.9 per cent. after the first ten days.

The patient gained rapidly in strength and in general condition, was out of bed in twenty-eight days, and was discharged well about a fortnight later. The dusky color of the skin gradually disappeared. She remained in perfectly good health for fourteen months after the operation, and then suddenly died without any preceding illness. The clinical diagnosis was cerebral embolism. Autopsy was unfortunately not permitted.

Pathological Report of the Specimen.—The mass retains the general outline of the kidney. The external surface is generally nodular, with many points of injection from adhesions. nodules vary in size from three to six centimetres in diameter, and compose practically the whole upper half of the kidney. The capsule is thickened and firmly adherent over the nodular area. On section, the whole upper half of the organ is occupied by a new growth, except for a small bit of renal tissue at the tip. There is one-half calyx in the lower half from which pyramidal tissue radiates. This area presents small, yellowish, discrete nodules, a few millimetres in diameter scattered through it, and the cortex is poorly defined. The tumor mass, which occupies the whole upper half of the kidney, extends from just beneath the capsule into the pelvis of the kidney. It possesses a distinct capsule of its own. The tumor is generally yellowish in color. with areas of hæmorrhage scattered through it. There is an irregular trabeculation of a firm, lighter-colored tissue making many small compartments of yellowish or reddish-yellow tissue. Some of these areas have degenerated and are soit, but for the

most part the growth is firm and elastic. Histological diagnosis, hypernephroma.

In the Medical and Surgical Reports of the Boston City Hospital, 1903, there is an admirable article by Drs. Paul Thorn-dike and J. H. Cunningham upon the subject of hypernephroma, in which reference is made to this case as one of a series, and in which there are three figures, illustrating the typical histological appearances of this variety of new growth, which were taken from specimens cut from the tumor of this kidney, and which are here reproduced by the courtesy of the writers of the above mentioned article. (Figs. 3, 4, and 5.)

CASE II .- Fibro-Adenoma of Inner Wall of Ileum causing Intestinal Obstruction; Resection of Fourteen Inches of the Intestine, including the Tumor; End-to-End Suture; Uneventful Recovery, December 2, 1903. The patient, a woman aged fortyfour years; previous history of good health until six weeks previous to being admitted to the surgical service of the Boston City Hospital. At that time she began to have attacks of colicky pains in the abdomen, increasing gradually in severity up to the present. Associated with these attacks of pain there were alternating constipation and diarrhea. For the last few days there has been no movement of the bowels, and the abdominal pain has become worse. General health has not suffered importantly. The pain has not been localized in one part of the abdomen at any time. Intestinal peristalsis well marked, can be seen and felt during the attacks of pain. Examination of the heart, lungs, liver, spleen, stomach, uterus, and adnexa negative. dominal wall is rather relaxed and flabby. There is no evidence of acute peritoneal inflammation.

On the right side of the abdomen is a tumor about the size of an orange, but of oblong form. It is freely movable, and can be pushed readily from the position which it usually occupies—just below the border of the right lobe of the liver—to a point below the crest of the ilium and beyond the median line also. The tumor changes its place also spontaneously from time to time within the above-named radius.

Operation.—The abdomen was opened in the right linea semilunaris by a three-inch incision. The tumor was then seen to have its seat within the small intestine-ileum, a little below the jejunum.

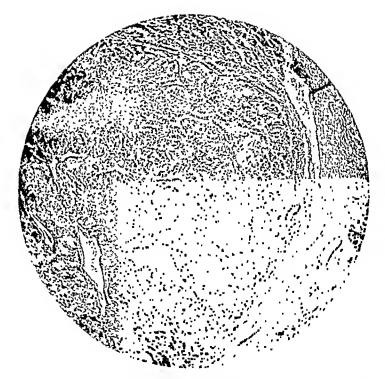


Fig. 3.—Case I. Stained with methylene blue and eosin. \times 25 diam. Note thin capsule with lymphoid cell infiltration below; wide vascular spaces; general tubular or adenomatous appearance; areas of degeneration above (pale staining).



Fig. 4—Case I. Stained with methylene blue and eosin. \times 80 diam. Note vascular stalks, tubular appearance emphasized by lighter spaces (in part due to cell degeneration) lying outside well-nourished cells immediately facing capillaries

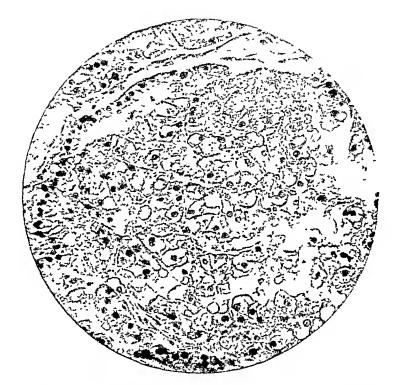


Fig. 5.—Case I. Stained with methylene blue and eosin. \times 200 diam. Note oval or polygonal shape of eells; preservation of their rim of eytoplasm; deeply staining nuclei sometimes lying upon cytoplasm threads; the perinuclear, lightly staining spaces, often filling the whole eell, and somewhat characteristic of hypernephroma.

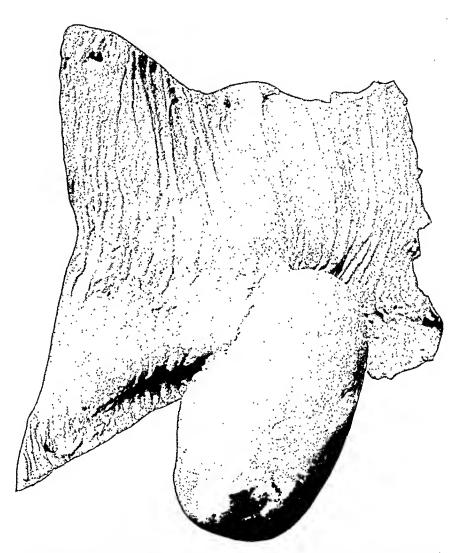


Fig. 6.—Case II. Benign fibroadenoma growing from the inner wall of the ileum. Actual reproduction will be four-fifths of actual size. Intestine is divided longitudinally, and its inner surface is shown with tumor growing from it.

The intestinal wall for twelve inches above the seat of the tumor was greatly thickened, in places inflamed; and the mesentery corresponding to this area was likewise thickened and its glands enlarged and indurated. The tumor was egg-shaped and of firm consistency, and was somewhat movable within the lumen of the intestine.

Fourteen inches of the intestine, including somewhat more than the thickened portion of it, and also the whole of the above noted part of the mesentery, were removed, together with the tumor. The severed ends of the bowel were brought together by an end-to-end suture with Cushing right-angle stitch. The abdominal wound was closed without drainage.

The patient made an uninterrupted recovery, and was discharged well and entirely relieved of her previous symptoms at the end of the third week after the operation.

The part of the bowel which had been removed on being laid open lengthwise showed a tumor of the size and form that appear in the accompanying illustration. (Fig. 6.)

Examination of the specimen showed the growth to be a benign fibro-adenoma. The enlargement of the mesentery and its glands was of inflammatory origin, and that of the intestine was due in part to hypertrophy of its muscular structure and in part to inflammatory changes. The distal end of the tumor nad an ulcerated area upon it about the size of a one cent coin, otherwise the surface was smooth and had undergone no degenerative changes. The growth sprang from the inner surface of the intestine, to which it was connected by a pedicle about one-quarter of an inch in diameter. Its surface was smooth and in texture the growth was firm and fleshy. The color of the surface was that of normal mucous membrane except at the point occupied by the ulcer above noted. The patient was seen eight months later and was well.*

^{*}Unfortunately, the specimen was mislaid before a thorough histological examination could be made of it; hence the meagreness of the report in this respect. Apart from that feature of the case, its interest lay in the difficulties in making an exact diagnosis before the operation, in the large size of the growth, and its relative rarity. It measured in its long diameter three and one-fourth inches, and in its transverse one just a fraction less than two inches.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, October 26, 1904.

The President, HOWARD LILIENTHAL, M.D., in the Chair.

ACUTE HÆMATOGENOUS INFECTION OF THE KIDNEY.

DR. GEORGE E. BREWER presented a woman, twenty-two years old, who was admitted to Roosevelt Hospital early in October of the present year. She was supposed to be suffering from acute appendicitis. Five days before admission she was suddenly seized with an acute pain in the right side of the abdomen, which was so severe that she was obliged to leave her work and go to her home. During that day her sufferings were intense, and consisted, in addition to her pain, of severe nausea, some vomiting, chills, and fever. During the next four days her condition remained about the same, and on admission to the hospital her temperature was found to be 104° F.; pulse, 130, and of poor quality.

There was marked tenderness over the entire right half of the abdomen, more particularly over the gall-bladder in front and the costovertebral angle behind. From these points downward the tenderness gradually diminished. At McBurney's point only slight tenderness could be elicited on deep pressure. There was moderate rigidity of the right rectus muscle, more marked above than below. Vaginal examination revealed slight tenderness in the right half of the pelvis, and by bimanual palpation this tenderness seemed to be limited to the region of the Fallopian tube, which was slightly thickened. The urine contained a trace of albumen, hyaline and granular casts, and a few pus-cells. Cystoscopic examination was negative. The ureters were catheterized, and urine drawn from the right kidney differed from the left only in showing a few more white cells. Blood examination gave a leucocytosis of 18,000.

The night after her admission the patient's temperature rose to 105° F., and remained between 103° and 105° for three days. On the fifth day after her admission she was apparently getting more septic and prostrated, and, as there was considerable difference of opinion regarding the diagnosis, an exploratory laparotomy was quickly made under ether anæsthesia. Nothing abnormal was found in the gall-bladder, liver, cæcum, or duodenum. Through the abdominal wound the kidney was palpated and thought to be somewhat enlarged. A second incision was made in the lumbar region exposing the kidney. The areolar tissue in the retroperitoneal space was ædematous, as was the fatty capsule and kidney. On removing this the kidney appeared deeply congested, with numerous subcapsular hæmorrhages. It was incised, and the cortex was found to be the seat of numerous infarcts. A hasty nephrectomy was done, the wound closed in the usual manner, and a dressing applied.

The patient's temperature dropped in six hours from 105° to 97.5° F., and during the following two days was most of the time subnormal. Her convalescence was rapid, the stitches being removed at the end of ten days. The secretion of urine from the first was satisfactory, varying from thirty to sixty ounces in twenty-four hours.

The case was of interest, Dr. Brewer said, for the reason that the lesion was undoubtedly a secondary one, due to blood infection, and was apparently the only lesion of any importance in the body, furnishing all, or nearly all, of the toxins which gave rise to her grave symptoms. In reply to a question, the speaker said that no cultures were made.

Dr. Charles H. Peck, who had seen the patient shown by Dr. Brewer, said that the clinical picture presented was one of violent sepsis, and it was difficult to believe that the kidney was the only source of infection, without any other focus in the body. The rapid subsidence of the symptoms after the removal of the kidney was very striking.

DR. Andrew J. McCosh said that a few years ago he saw a young physician some weeks after a severe attack of measles. Following this, he became desperately ill, and at operation it was found that two abscesses had developed in the kidney, one at the upper, the other at the lower pole, which did not involve the pelvis of the organ. The urine had shown no trace of pus. The kidney was incised, and the abscesses opened and drained. The patient made a slow recovery, and was now entirely well and practising his profession.

DR. LILIENTHAL referred to a case he had reported some years ago. The patient had an attack of erysipelas, followed by a multiple hæmatogenous infection of both kidneys. Repeated nephrotomy was done on both sides, and the kidneys were saved. In Dr. Brewer's case, however, the violent onset of the symptoms and their persistence certainly called for nephrectomy. The speaker said it was to be regretted that no cultures were made from the infarcts.

DR. Brewer, in closing, said the source of the kidney infection could not be found. There was slight tubal tenderness, but this had never interfered with her work.

PAPILLOMA OF TRACHEA.

Dr. Brewer presented a boy, aged eleven years, who was admitted to the Roosevelt Hospital in July last. When five years old, he had suffered from extensive papillomatous disease of the larynx, which interfered considerably with respiration. After unsuccessful local treatment, an operation was advised by those in attendance. This was declined by the parents, and the condition grew steadily worse until the dyspnæa became so severe that an emergency tracheotomy was done. The tube was worn continuously for a number of months, during which time local treatment was applied to the laryngeal mucous membrane. Several attempts were made to remove the tube, but on each occasion marked difficulty in breathing followed, necessitating immediate replacement.

After consulting a number of surgeons and laryngologists, the boy finally came under the care of Dr. Frank E. Miller, of this city, who by persistent local applications succeeded in removing the greater portion of the laryngeal growth. This, while it left a sufficient opening in the glottis for ordinary respiration,

afforded no relief, for as soon as the tube was removed the dyspnœa was extreme. It was evident that an obstruction existed in the trachea immediately above the opening for the cannula.

The boy's general condition was poor; he was anæmic, had a chronic bronchitis, and was exceedingly thin. Around the tracheal opening there was an extensive area of inflammation.

On July 5, 1904, under ether anæsthesia, an incision was made in the median line extending from the body of the hyoid to the sternum. The trachea was exposed with considerable difficulty below the original tracheotomy wound, where it was incised and a new tube inserted. The soft parts were then removed from the larynx and the upper segment of the trachea. After all hæmorrhage was arrested, the patient was placed in the Trendelenburg position, and the larynx and trachea freely opened by a median incision extending from the thyrohyoid membrane to the original opening in the trachea. A solution of adrenalin chloride was immediately applied to the cut surfaces and to the laryngeal and tracheal mucous membranes. The tracheal wall was then retracted, exposing the entire mucous lining. Immediately above the old tracheal opening there was found a large papillomatous mass completely plugging its lumen, and attached by a comparatively small pedicle to the left side of the trachea. The mass was about the size of a large blackberry. It was easily removed, and its point of attachment touched with the actual cautery. Several papillomatous masses on and below the vocal cords were also removed. A large rubber tube was then placed within the trachea, extending from the lower tracheal opening upward through the larynx into the pharynx. This was secured by a thread passed from its upper extremity upward through the mouth and tied to the right ear. The trachea was closed over this by one or two catgut sutures; the cutaneous wound was partly closed, and the dressing applied.

The operation was followed by moderate shock. The rubber tube was coughed out at the end of six hours. No embarrassment of the respiration followed its removal, and the patient's convalescence was uneventful. He gained rapidly in flesh and strength, and his bronchitis entirely disappeared. He was now able to go to school, and, although his voice had not returned completely, it was constantly improving.

PAPILLOMA OF THE LARYNX AND TRACHEA.

Dr. John F. Erdmann showed photographs of a girl, now about seven years old, who was referred to him by Dr. C. G. Coakley, and was operated on in November, 1903. She had been operated on at the age of three years by a physician in the South for papillomata of the larynx; so far as could be learned from the history, a high tracheotomy was done and the larynx curetted through this incision.

When the patient came under Dr. Erdmann's care, about two and one-half years later, she presented a dense, cicatricial area in the neck, which corresponded to the upper three tracheal rings and the cricoid cartilage. She was suffering from dyspnœa to such an extent that an emergency operation was necessary. Dr. Coakley had been able, by laryngoscopic examination, to recognize the presence of the papillomata. Tracheotomy under cocaine was done, then a tube was introduced, and chloroform given by means of a funnel and long tube. Owing to the child's condition, it became necessary to substitute ether for the chloroform. A thyrotomy was then done, and a papillomatous mass about the size of a large filbert enucleated. The base of this papilloma was then touched with carbolic acid, the split thyroid cartilage was brought together with catgut, and the wound in the neck closed with the exception of the point where the tracheal tube was inserted. The wound healed rapidly and the tube was removed within a few days. A few weeks later, however, the dyspnæa recurred. This was thought to be due to a stricture formation as the result of the removal of the mucous membrane and the application of pure carbolic acid. Acting on this supposition, intubation was done and gave entire relief. Upon the removal of the intubation tube, however, profound dyspnæa would recur, and in one of these attacks it was necessary to do a tracheotomy before the tube could be replaced. Successive sized tubes were introduced with the view of preventing stricture formation, and also to try the effect of pressure upon the papillomatous growths, which were known to have recurred.

The child's family were anxious to take her away for the summer, and in order to be on the safe side it was deemed advisable to insert a tracheal tube and remove the intubation tube. This was done in June, and at that time the tracheal wound was perfectly clean. Three months later, on her return, a large papillo-



Fig. 1.—Papilloma of larynx and trachea.



matous mass surrounded four-fifths of the opening of the tracheal wound; this was partially sessile, extending to the edge of the wound, and partially pedunculated, protruding from the trachea between the edges of the wound and the tracheal tube. (Fig. 1.)

The second operation was done by Dr. Erdmann three weeks ago. The papilloma at the tracheal wound was cut off, and the incision extended downward as far as possible. It was observed that with each expiration the tube through which the ether was being administered would become plugged, spreading the edges of the wound. This proved to be due to the fact that a pedunculated papilloma, fully the size of a hazel-nut, was acting as a ball-valve. This growth was pulled up through the wound and excised. The wound was then extended upward, again splitting the thyroid cartilage and cutting to the hyoid bone and dividing the base of the epiglottis. Papillomata were found all the way up to the epiglottis, and a large mass protruded upward into the oropharynx. After thorough extirpation, the mucous membrane was carefully dissected from all suspicious looking areas. The tracheal tube was left in the lower angle and the wound packed. It was considered advisable to leave the wound open, so that proper treatment could be instituted in case of a recurrence. This proved to be a wise precaution, as very recently the upper portion of the wound showed a fungous growth which pointed to a recurrence.

Dr. Robert H. M. Dawbarn asked Dr. Brewer whether in dealing with these cases it would not be advisable to save the cricoid cartilage. Unless this cartilage thoroughly reunited, it would seriously interfere with the *timbré* of the voice, and the division of this rigid band was to be deprecated unless it was absolutely necessary.

DR. Brewer, in closing, said his reason for cutting the cricoid cartilage was that a child of this age had a very delicate trachea, and it would have torn even upon slight traction. It was thought better to divide the cricoid, therefore, rather than run the risk of tearing loose the trachea from that cartilage.

CONGENITAL INVERSION OF THE APPENDIX.

DR. Brewer presented a woman, twenty-two years old, who was admitted to the Roosevelt Hospital in the spring of 1904, suffering from pain, tenderness, and muscular rigidity in the

right iliac fossa, together with fever, nausea, vomiting, and prostration.

On examination, there was acute tenderness in the region of McBurney's point, and on deep pressure an indefinite mass could be felt, strongly suggesting an appendicular abscess. On opening the abdomen, a dense mass of adhesions was found, consisting of the cæcum, omentum, and several loops of small intestine. These were with difficulty separated, but after prolonged search no sign of an appendix could be found. cæcal wall seemed somewhat thickened, and in the course of the search for the appendix the cæcum was wounded, but immediately repaired. The search for the appendix was a very thorough one, and was continued until the condition of the patient necessitated the closure of the wound. She made a prompt recovery from the operation, and was discharged in about three weeks. From time to time during the next five months she returned to the hospital, complaining of pain in the right inguinal region, which was so severe on exertion as to prevent her attending to her household duties.

On examination, the patient was found to be anæmic, badly nourished, excessively nervous and hysterical. On attempting to palpate the abdomen she screamed, cried, and moved about to such an extent that successful palpation was impossible. This led to the opinion that the condition was largely hysterical, and no operative interference was advised for several weeks. Her persistent complaints, however, finally led to the proposal of an exploratory laparotomy, in the hope of finding something to account for the symptoms.

Early in July, 1904, under ether anæsthesia, the abdomen was opened by the Kammerer incision, along the outer border of the right rectus muscle. On opening the peritoneal cavity a dense mass of adhesions was encountered, necessitating considerable dissection before the structures could be identified. The cæcum was finally isolated, and its three longitudinal bands followed downward to their junction at the inferior extremity of the gut, but no trace of an appendix could be found. The cæcum was then dissected free from the abdominal wall, and, with the ileum, raised so that every part could be thoroughly inspected. By this means, Dr. Brewer said, they were able to convince themselves that no trace of an appendix existed. At the usual site

of the appendix implantation, however, a small oblong tumor was felt within the cæcum. There was also a distinct transverse thickening of the colon just above the ileocæcal valve, which apparently formed a decided narrowing of its lumen. The bowel was incised longitudinally through its cicatricial band, and its cavity freely explored. It was found that this band formed a stricture which barely admitted the tip of the forefinger. The cavity of the cæcum itself seemed normal in size, but from its inferior extremity there projected inward a rounded mass, about one inch in length and with a diameter corresponding to that of an ordinary lead-pencil. This mass seemed covered with a thickened mucous membrane of a deep red color. It was suggested at the time that the mass had the appearance of an inverted appendix which had been chronically inflamed. The mass was divided with scissors at its attachment, and the mucous membrane stitched over the stump. It was preserved in a mild solution of formalin and sent to the Pathological Laboratory of the College of Physicians and Surgeons for examination.

The wound in the cæcal wall was closed by a row of sutures, converting the longitudinal into a transverse wound, which resulted in a very considerable enlargement at the point of stricture. The patient made a satisfactory convalescence, the wound healing primarily. Since the operation she has been entirely relieved of her symptoms, and has gained considerably in weight and strength.

The following is the report of Dr. Norman E. Ditman, Assistant Pathologist at the Roosevelt Hospital: The specimen shows a section of an inverted appendix, epithelium of the mucous membrane being present upon both the inner and outer surfaces of the mass. The peritoneal surfaces have become fused, and throughout the greater part of their extent there is no sharp line of demarcation between the two layers. The appendix is the seat of a mild, chronic inflammation. In addition to this there is a recent exudation of pus-cells, with great congestion and dilatation of the peripheral capillaries, pointing towards a strangulation at some point nearer the base.

Dr. Peck said he was present at the first operation, and could verify the statement that the appendix was not removed. A very thorough search was made without succeeding in finding it. The bowel itself was accidentally opened, but no sys-

tematic search of its interior was made. There was a good deal of evidence of typhlitis or inflammation of the entire cæcal wall at the time of the primary operation.

RESULT OF EXCISION OF MIDDLE THIRD OF BOTH STERNO-CLEIDOMASTOID MUSCLES.

Dr. Robert H. M. Dawbarn presented a woman, twentytwo years of age, who four years ago began to develop tubercular lymph nodes in large masses beneath the sternocleidomastoid muscles, chiefly upon both sides, but worse upon her left, which side was first operated upon, therefore. In order to obtain light and room for safe work, the muscle in question was divided in its lower part, about the junction of the lower third with the upper two-thirds. As the operation presently showed, pressure by the mass of diseased glands had led to obliteration of all vessels passing downward in the muscular substance from its origin or thereabouts; consequently, he feared for the life of the central portion of the muscle, now cut off from nourishment both below and above. On the fourth day Dr. Dawbarn revised the wound and cut away the middle third of the sternomastoid, now plainly dead and beginning to decompose. Also, as a corresponding length of the deep jugular was sloughing, it was deemed safest to prevent a possible secondary hæmorrhage by tying above and below and excising the same length of this vein. The corresponding pneumogastric nerve was apparently gangrenous, but was left, with gauze drainage of the wound. Before this revision (twenty-four hours) the heart began to race; and from that time, for a few weeks subsequently, this tachycardia was continued in spite of various medicinal attempts at slowing the pulse-rate. between 120 and 150, and notwithstanding there was no dyspnæa nor cyanosis from walking about the room. Ultimately, the heart action became normal once more.

A few months after the first operation, Dr. Dawbarn extirpated the enlarged glands on the opposite side of the neck, and for the sake of symmetry took out the middle third of the sternocleidomastoid muscle on that side, too. The removal of this section of the muscle on both sides apparently had no effect whatever on the motion of the parts, as was demonstrated before the society—the patient moving her head freely in all directions. Moreover, whereas formerly her muscles stood out prominently from a thin

neck, now the neck is round and shapely; much the better in appearance for their loss. Dr. Dawbarn expressed surprise that such large and active muscles should not be missed in function.

The patient was also suffering from an extensive lupus erythematosus involving both sides of the face. One side had been treated with the X-rays, the other with the Finsen rays, and the lesions had apparently improved to a somewhat greater degree under the latter than under the former therapeutic agent.

In the neck, one gland, the size of a chestnut, had appeared beneath the body of the lower jaw since the operations. This, upon suggestion of Dr. Tiffany, of Stamford, Connecticut, he had treated by daily inunction of an ointment of phytolacca, with benefit. At present it is reduced fully one-half.

As a further point of interest in this case, at this first operation upon her left, while dissecting out bluntly the lowest glands, about three centimetres below her clavicle, the wound suddenly filled with a milky fluid. Fortunately, this happened coincidentally with the removal of the diseased gland in question; and prompt packing with gauze, maintained in place for ten minutes, was not followed upon its withdrawal by any further escape of chyle. Such a tear into the thoracic duct is new in Dr. Dawbarn's personal experience.

Dr. Brewer said he agreed with Dr. Dawbarn that removal of the sternocleidomastoid was attended with very little loss of function. In a case he saw last winter he was obliged to remove nearly the entire muscle on one side. The operation was not followed by torticollis, and almost normal motion had since been regained.

INOPERABLE ROUND-CELLED SARCOMA OF THE CHEST WALL, INVOLVING RIBS, SUCCESSFULLY TREATED BY MIXED TOXINS OF ERYSIPELAS AND BACILLUS PRODIGIOSUS.

DR. WILLIAM B. COLEY presented a boy, sixteen years old, who enjoyed good health up to 1903, when he had an attack of what was considered to be pleurisy with effusion. He was aspirated, but the dulness over the chest persisted, and he rapidly lost flesh and strength. He was sent South without improvement, and early last March entered the Johns Hopkins Hospital, where he was operated on for a supposed empyema. A

large incision was made, revealing a necrosis of the eighth and ninth ribs, and behind these some gelatinous masses were found. These were partially removed and pronounced round-celled sarcoma. On the 26th of last May the patient was admitted to the General Memorial Hospital, where for two months he was treated with regular injections of the mixed toxins of erysipelas and bacillus prodigiosus. He also had X-ray treatment three times a week. At the beginning of the treatment there was a mass about the size of a man's hand over the ribs, with an extensive, sarcomatous-like sloughing area in the centre. The tumor has entirely disappeared. The patient's general health had also improved and he had gained twenty-six pounds in weight. He returned to his home in Canada, since which time he has received from two to three injections weekly of the mixed toxins in smaller doses.

STRICTURE OF THE ŒSOPHAGUS.

DR. JOHN A. HARTWELL presented a male infant, twenty months old, who was admitted to Bellevue Hospital on June 30, 1904. About two months previous to his admission he had swallowed a few drops of caustic potash, which burned his lips and mouth. A month or six weeks later his mother noticed that he had difficulty in swallowing. On admission, he could swallow fluids only, and with difficulty.

An attempt was made to pass an œsophageal bougie three millimetres in diameter, but this was stopped about five inches from the teeth-line. Gastrostomy was done in July 5, under ether anæsthesia, by the Kader method. For two weeks subsequent to the operation the child was fed through the mouth, taking peptonized milk and broth without any leakage from the gastrostomy wound. By that time the wound had healed, and a non-inflamed opening into the stomach presented. On July 19 the patient was given a glass of milk with a silk thread coiled up in it. This he swallowed, and by means of a blunt hook the thread was caught and drawn out through the gastrostomy wound on the first attempt. This was left in situ for twenty-four hours to accustom the boy to its presence, and then a No. 14 olive-tipped bougie of the Dunham pattern was drawn down to the stricture by means of the silk. A fish-line thread was then drawn through the œsophagus beside the bougie and brought to bear

on the stricture. With the pharyngeal and stomach guides in situ, the stricture was cut with ease, and the olive bulb on the wire passed through the point of stricture. This was repeated with increasing sized bougies, until a No. 32 F. could be introduced, the length of stricture cut appearing about three-quarters of an inch. The same night the patient was allowed fluids by the mouth. These he took without difficulty. The thread was left in situ, and the gastrostomy wound kept open by passing a catheter through it once daily. The æsophageal bulbs of Dunham were passed at ten-day intervals for a month, and then the conical whalebone bougie of thirty-five millimetres circumference was passed by mouth. The gastrostomy wound was then allowed to close spontaneously, and by the passage of the latter bougie every ten days the stricture has been kept open, so the child swallows ordinary food with ease. A longer interval than ten days permits of sufficient contraction to produce a difficulty in taking solid food.

DR. DAWBARN said that about ten years ago he saw a hysterical girl who was suffering from repeated nose-bleeds, and it finally became advisable to tampon the nasopharynx. The patient, however, refused to permit the catheter to be introduced through the nose. Dr. Dawbarn then asked for some sewing-silk, and rolling about five or six feet of it into a tight ball he introduced this into the nose, and then she inhaled it and hawked it up through the mouth.

Dr. Hartwell, in reply to a question as to what the normal caliber of the esophagus of a young child was, said he had no definite information on that point, but from observations made in the dissecting-room he was led to believe that it was about No. 35 F. He had found that this sized bougie easily passed through the normal parts of the esophagus in this case. In connection with the subject of esophageal stricture, Dr. Hartwell said he had recently heard of a case under the care of a Boston surgeon in a patient who refused to submit to gastrostomy. She was given a string to swallow with drinking-water, and the string was allowed to pass through the stomach and for some distance along the intestine. In this manner the lower end of the string became so firmly fixed that it could be rendered taut from above, and served as a guide for the passage of a tunnelled bougie into the stomach.

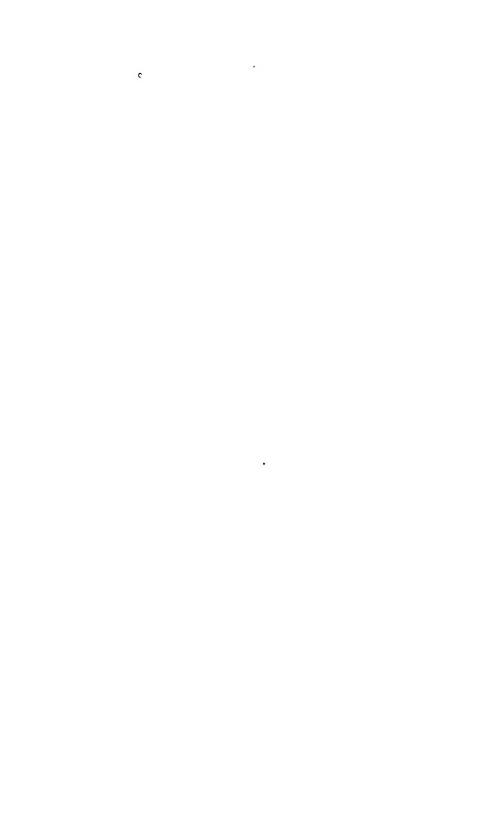
FRACTURE OF LOWER END OF FEMUR, WITH VICIOUS UNION.

Dr. Hartwell presented a boy of sixteen years who was admitted to Bellevue Hospital on July 27, 1904. Four months previously a horse he was riding fell with him, his right leg and lower thigh being caught between the horse and the pavement. He was taken to a hospital and put to bed with no other treatment than an ice-bag applied to the knee. He did not recall how long it was before he was allowed to get up and walk about.

On his admission to Bellevue the following condition was found to exist: The right knee could be hyperflexed, both actively and passively, but extension was limited to about 160 degrees passively, and a little less actively. There was no pain in this movement. The hindrance to complete extension seemed to be bony, although the posterior soft tissues were also drawn very tense. Palpation of the lower end of the femur showed a marked thickening just above the epiphyseal line, and there seemed to be an angular deformity at this point, with the lower fragment bent acutely inward, so that the inferior end of the condyles looked downward and backward nearly to 45 degrees. There was firm bony union between the fragments. The right extremity was an inch and a half shorter than the left. The radiograph apparently corroborated the diagnosis of an oblique fracture from before backward and downward of the lower end of the femur, with backward tilting of the condylar fragment.

On August 1, an incision was made on the external aspect of the femur, just in front of the biceps tendon. This was carried down to the bone just above the joint and the epiphyseal line, and on pushing aside the periosteum no line of fracture could be felt. On passing the finger under the periosteum, however, to the inner side of the bone, the line of fracture, as diagnosed, could be felt, together with the displacement. An attempt to break up the union with the chisel from the wound failed, and accordingly an internal longitudinal incision was made in the line of the adductor tubercle. This was carried down to the bone, and with the mallet and chisel the lower fragment was loosened, and complete separation effected by bending the bone laterally. It was then ascertained that the line of fracture was oblique, from a point about two inches above the epiphysis on the inner side of the femur, outward and downward to the epiphyseal line at the centre of the bone, and thence an epiphyseal





separation from the outer side of the shaft. The lower fragment thus included about two inches of the inner half of the shaft attached to the epiphysis, which had separated from the outer half transversely, and this fragment had tilted backward and united in such a way as to cause considerable shortening and produce the downward and backward aspect of the condyles. This accounted for the symptom of hyperflexion and limited extension, and also explained the absence of a fracture line on the outer aspect of the shaft, the line here being the epiphyseal line, which was below the lower end of the incision. The joint was not opened during the operation. The fragments were brought into very fair apposition by traction on the leg and direct manipulation of the fragments with large bone hooks. The shortening could be entirely done away with, and full extension was possible. The wounds were sutured, with a small kangaroo tendon drain left in the internal one. A plaster-of-Paris splint was applied with the limb in the normal fully extended position, and the fragments forced as nearly as possible into correct apposition. No sutures were used to unite the bone, but the periosteum was carefully sutured. After twelve days a window was opened and the wounds found practically healed. At the end of four weeks the splint was replaced by a posterior one, and in about seven weeks, union seemingly absolutely solid, the patient was permitted to walk. Complete extension was then possible, and there was no shortening. Owing to stiffness in the knee-joint, however, only limited flexion was obtained. It was deemed wise to treat this latter only by walking exercises and massage rather than by any forcible breaking up of adhesions. Now, at the end of about ten weeks, flexion was easily carried beyond 45 degrees, and was increasing rapidly from day to day. Extension was complete and there was no shortening. The functional result promised to be completely satisfactory, though the anatomical result as determined by the radiograph shows still a considerable angularity between the fragments. (Fig. 2.)

AMPUTATION OF SHOULDER-GIRDLE.

Dr. Hartwell presented a man, fifty-five years old, who was admitted to Bellevue Hospital on July 11, 1904. His family history was negative. Twenty-one years ago he fell, striking on his right shoulder and hip, sustaining contusions, but no fracture, and he was incapacitated by the accident for only one week.

Fifteen years ago he first noticed a lump about the size of an English walnut on the top of the right shoulder. For twelve years it grew slowly, but constantly, until it attained a size about four or five inches in diameter. After that it grew more rapidly, and had nearly doubled in size during the past two years. It had never caused him any pain to speak of, and there had been no interference with the movements of the arm. He applied for relief only because the mere size of the tumor interfered with his work, and for the past six months he had been losing weight and strength, which he thought might be the fault of the growth.

· The tumor measured about nine inches in its long diameter and four to five inches across, with a height of about five inches above the clavicle. It was firmly attached to the outer half of the clavicle, to the acromion, and for a small distance to the spine of the scapula. It extended from the inner third of the clavicle out beyond the deltoid insertion. On the chest it extended two or three inches below the clavicle, and behind its base passed over the outer portion of the spine of the scapula, just about covering the deltoid border. On this extensive base it was movable to some extent, all the tissues moving with it. In consistency, it resembled the liver, though some portions were harder than others, giving something of a nodular outline to the tumor. There were many large veins passing superficially over it, and the skin was of a bluish tint, and in places thin and just ready to ulcerate. One or two superficial ulcerations already There was a fluctuating, globular mass in the axilla, the size of a small orange, which was movable under the skin and in the deep parts. (Figs. 3 and 4.)

On the inner and posterior aspects of the left thigh, near the gluteal fold, was a second large tumor, several inches in circumference, which in its general appearance resembled a lipoma, but in the centre of which existed a hard, nodular mass, of the nature of fibroid tissue. This tumor he had had ever since he could remember, and he declined to have it removed or a section taken from it. A specimen removed from the shoulder was diagnosed as endothelioma.

Amputation of the shoulder-girdle was done on July 16 of the present year, under nitrous oxide and ether anæsthesia. As a first step, an incision was made over the inner end of the clavicle, this bone exposed, and a two-inch section of it removed with the Gigli saw. This exposed the subclavian vein and the

Fig. 3.—Endothelioma of shoulder, anterior view.



Fig. 4.—Endothelioma of shoulder, lateral view.

transversalis coli and suprascapular arteries, all of which were caught in loose ligatures. The scalenus anticus was then divided near its insertion, and the subclavian artery easily reached, doubly ligated with chromic catgut, and divided. The vessels already exposed were then ligated with plain gut, thus limiting as much as possible the amount of blood in the arm. The incision was then carried outward an inch below the anterior border of the tumor and across the axilla below the mass that existed there. The central flap was dissected inward, the pectoral muscles exposed and divided at the level of the skin incision, and the whole axillary contents cleaned out, still attached to the under surface of the tumor. A posterior skin incision was then made, following one inch outside the border of the tumor down into the axilla, below which it joined the anterior incision. The central portion of the posterior flap was dissected inward to the vertebral border of the scapula and downward to the angle. Division of the muscles holding the scapula to the body was then made, the latissimus dorsi was cut through at the level of the scapular angle, and thus the disarticulation in one mass was completed. The early ligation of the vessels so effectually controlled the hæmorrhage that not more than two or three ounces of blood, other than that in the arm, were lost. Five minutes before cutting through the brachial plexus near the outer border of the scalenus anticus, ten or fifteen minims of a 2 per cent. solution of cocaine were injected into the trunks, as suggested by Crile. no accurate blood-pressure tests were made, the palpating finger could detect no change in the pulse when the nerve-trunks were divided, and the patient seemed to suffer no shock.

The flaps were easily drawn together without tension, the removal of the deep tissues more than compensating for the loss of skin. A drain was inserted in the lower end of the pocket, through an incision made for that purpose. The condition of the patient was excellent, considering the extent of the operation. Convalescence was uneventful, except for a slight infection in the inner end of the wound, which separated, and finally closed by granulation at the end of several weeks.

Dissection of the tumor showed it invading the clavicle, in the outer end of which there was a hole of about two drachms' capacity, which was filled with the new growth. The periosteum of the clavicle was destroyed in its outer half. The scapula and humerus were not involved.

Pathological report made by Drs. Ewing and Strauss. The structure of the tumor is that of an alveolar endothelioma. The cells are rounded or polygonal in form, of medium size, with homogeneous protoplasm and densely staining compact nuclei. They are arranged in convoluted rows surrounding small alveoli. The alveoli are everywhere embedded in mucus, into which the tumor cells are being transformed. This form of degeneration has probably had much influence in limiting the malignancy of the growth. The tumor masses are rather sharply separated from the surrounding connective tissue, which they show little tendency to invade. The exact histogenesis of the tumor it is impossible to state. In several places the alveoli are distended with blood, suggesting an origin from vascular endothelium, but, on the other hand, most of the alveoli are collapsed and empty. Most tumors of this histological type are derived from the endothelium of lymph vessels. The whole tumor has a markedly embryonal type, suggesting the possibility of origin from a remnant of embryonal tissue. The very definite connection of the tumor with the periosteum of the clavicle suggests an origin from the endothelial structure of this tissue, and such origin has frequently been assigned to tumors of bone showing the same general structure as the present tumor.

SOME EXPERIMENTS WITH A NEW METHOD OF CLOSING WOUNDS OF THE LARGER ARTERIES.

Dr. George E. Brewer read a paper with the above title, for which see page 856.

DR. DAWBARN said he had done some experimental work along the lines indicated in Dr. Brewer's paper, and his experience had led him to doubt whether it would be practicable to employ an adhesive material in the closure of wounds of the arteries. The surface of the arterial walls was always moist, and a number of years ago, the speaker said, it occurred to him that it would be desirable to find something that would adhere to a moist surface, and that would take the place of a suture in intestinal work. He experimented with a great many substances, even going to the trouble of obtaining a sample of a peculiarly adhesive kind of mistletoe growing in Japan, but all were open to the objection that they would not adhere to a moist surface. Instead of an adhesive substance. like rubber plaster, Dr. Daw-

barn suggested that Cargile membrane might answer the purpose in dealing with wounds of the larger arteries.

DR. L. W. HOTCHKISS said that Dr. Dawbarn had lost sight of the most important feature of the rubber plaster in closing wounds of the larger arteries, namely, its elasticity, by which it exerted compression without constriction. While the possibility of an exudate over a torn surface like an artery should always be kept in view, there was little danger of its becoming trouble-some and washing away a compressing agent in the shape of an adhesive and elastic membrane, like the one shown by Dr. Brewer.

Dr. Joseph A. Blake said that while cases in which the method described by Dr. Brewer would be indicated were comparatively rare, they were very urgent when they did occur. The experiments with which Dr. Brewer had been extremely successful opened a wide field for further investigation. The idea seemed perfectly feasible, although the speaker said he did not think it would be applicable to an end-to-end union of the vessels. The plaster might be applied as an additional safeguard in such cases after suture.

Dr. Lilienthal said he saw Dr. Brewer resort to this method in an experimental operation on a dog last spring, and he was struck by the great difficulties he had to contend with. The speaker said he would be willing to give the method a trial in case he ever had the misfortune to wound a large artery, but not without employing sutures as well. If the rubber plaster acted so well without suture, then it certainly ought to be a very valuable adjunct to imperfect suturing, and in such a case might even prove a life-saving measure. While wounding a large artery was a rare accident, it was likely to happen to anybody.

was a rare accident, it was likely to happen to anybody.

Dr. Brewer, in reply to Dr. Dawbarn, said he thought that rubber plaster was preferable to Cargile membrane because the former maintained the normal elasticity of the artery. In regard to the use of sutures, Dr. Brewer said it was a difficult matter to suture an artery of small caliber, or one that was the seat of calcareous degeneration, or when high arterial tension was present, and under such circumstances the speaker said he would not hesitate to use plaster alone; and he would be inclined to do so in dealing with any artery that could be exposed and reached. In certain cases, of course, where the artery could not be elevated or surrounded, the method would be inapplicable.

EDITORIAL ARTICLE.

THE ANNALS OF SURGERY, 1885-1904.

The present issue of the Annals of Surgery completes the first twenty years of its publication. Its file presents now forty substantial volumes, through all of which, from No. I to No. XL, has worked the same editorial supervision, while the ideal of excellence both as to the scientific character of its contents and their typographical presentation, with which the Journal was inaugurated, has been continuously maintained.

Very singularly during all this time the Annals of Surgery has practically had the field to itself as far as journals in the English tongue were concerned; it is true that the general weeklies and monthlies have continued to publish many articles of a surgical nature that were of value and interest, and that other journals devoted to some aspects of surgery have from time to time appeared; gynæcological surgery, orthopædic surgery, and minor surgery and surgical technique have thus had organs, but in the wider domain of General Surgical Science and Practice in which the plans for the Annals of Surgery placed it, it has been permitted to pursue its own development without a rival. In other countries the production of a special surgical periodical literature has been much more marked during the same period. The special surgical journals of Germany, France, Russia, and Italy have become numerous and important. Their papers are of the highest value, and the work which they record may well stimulate the earnest emulation of surgeons everywhere.

The inauguration of the publication of the Annals of Surgery as a "Monthly Review of Surgical Science and Practice," as its title-page proclaimed, was due to the enterprise of a Western book publisher, Mr. James H. Chambers, of St. Louis, Missouri.

Interest always attaches to the beginning of things, if in their later development it has appeared that the things begun were of any importance, so, in view of the twenty years of history which this "Monthly Review" has since made and its increasing acceptance as a valued exponent of current surgical doctrine and effort, it may not be out of place to now record the circumstances attending its beginnings.

During the year 1883, the Anatomical and Surgical Society of Brooklyn, New York, had carried on the publication of a monthly periodical, with the title, Annals of the Anatomical and Surgical Society, in which addresses, papers, and discussions constituting the transactions of that Society were published. At the end of that year, this publication was continued; no longer, however, as a bulletin of the work of that particular Society, but upon more general lines, under the title of Annals of Anatomy and Surgery, under the proprietorship of Drs. Lewis S. Pilcher and George R. Fowler, who were also its editors. With much success and acceptability this journal continued to appear for three years. This was made possible, first, by the considerable interest which many surgeons in all parts of the United States were brought to take in the publication, and, second, by the familiarity with typographical affairs and efficiency as a business manager of Dr. James E. Pilcher, to whom the duties and responsibilities of publishing the magazine were referred. With the end of the year 1883, however, it appeared that it would be no longer possible to continue the further publication of the journal. Dr. James Pilcher had been commissioned as a medical officer in the United States Army, and had been sent to a distant post in the Northwest; Dr. Lewis Pilcher was sailing for Europe for a somewhat prolonged absence, and Dr. Fowler was burdened with other work which had to take precedence of editorial and publishing duties. Accordingly with the publication of the issue for January, 1884, the Annals of Anatomy and Surgery were suspended, without any thought upon the part of any of those who had been promoting its

publication of engaging in any similar work in the future. London, however, during the following spring, during an afterdinner talk between Dr. Pilcher and the well-known senior surgeon of the West London Hospital, Mr. Charles B. Keetley, the history of the Annals of Anatomy and Surgery was recited, and Mr. Keetley expressed the hope that at some time a more strictly surgical journal which should represent all English-speaking surgeons might be established, adding that he would gladly co-operate in such an enterprise. Without any plans or serious expectations along this line, Dr. Pilcher returned to New York the last of May, 1884. Awaiting his arrival in New York he found Mr. Chambers with a proposition for the establishment of a strictly surgical journal of the highest grade. That gentleman stated that he was satisfied there was a field for such a journal, that especially at the suggestion of Dr. Nicholas Senn and of Dr. Roswell Park, with whom he had consulted upon the matter, he was desirous of securing the co-operation of Dr. Pilcher in the editorial direction, and that he was willing to place in the hands of such editor the absolute control of the contents of such journal and a censorship over the advertising pages as well. During the ensuing summer further correspondence ended in the making of an agreement between Mr. Chambers and Dr. Pilcher on the lines of this first interview; the co-operation of Mr. Keetley, as a representative English surgeon, was unhesitatingly given when the proposition of the St. Louis publisher was communicated to him; a large number of the leaders in surgery in the United States and Great Britain were informed of the proposed publication, and without exception gave the enterprise their approval, and permitted the use of their names as endorsing it upon the title-page of the new journal; at the head of this list was the name of Lord Lister.

The first number of the new journal appeared January 1, 1885, and in regular succession it has continued to appear from that time to the present upon the first of each month. During the

earlier years abstracts and digests of the surgical literature of other lands formed a very important part of the contents of each number of the journal, but more recently, notwithstanding the increase in the number of pages of the journal to nearly twice their original number, the number of original contributions of value continually being offered for publication has become so great as to reduce to insignificance the abstract or "Index of Progress" department. This the Editor has seen occur with a distinct sense of loss on his part, for he had from the first felt that to bring first hand to the knowledge of English-speaking surgeons so much of the results of the work of able men published in other tongues was a function of no mean importance. During the seven years, 1885 to 1891 inclusive, the Annals of Surgery continued to be published at St. Louis by Mr. Chambers. It is probable, however, that the more sanguine and earlier expectations of the publisher as to the journal as a profitable business investment were slow in being realized. In the first place, such a journal was an expensive thing to publish, and the ideals of its editors prevented the introduction into it of a grade of surgical literature that might have made it appeal more strongly to the interest of large classes of medical men, while the location of its publication office in the West might possibly be considered as having a deterrent effect upon the extension of its subscription list among those to whom it expected to appeal for patronage, since a large proportion of these were to be found in the East. For this reason Mr. Chambers, after a number of years, offered the journal to Eastern publishers, and finally disposed of it to the University of Pennsylvania Press, by whom its publication was undertaken, beginning with January, 1892, and continued until June, 1897, when, upon the reorganization of that Association, the Annals of Surgery was transferred to the J. B. Lippincott Company, its present publishers. This then is the history of the origin of the Annals of Surgery. The forty volumes which now constitute its file show how well the editors have been able to carry out their

ideals, when it was inaugurated, that it should fully represent the highest attainments of current Surgical Science and Practice. They have been greatly helped in their endeavor by the fact that they were themselves active workers in the surgical field and were always in touch with their fellow-workers, whose needs and ideals they shared and kept in view in the shaping of each succeeding issue. While the chief burden of journalistic work has from the first been borne by Dr. Pilcher, nevertheless the assistance rendered by his collaborators has been frequent and most valuable. In Mr. Keetley, Mr. Treves, Mr. Jacobson and Mr. Cheyne, Dr. Macewen and Dr. White, the Annals has ever found wise counsellors, interested collaborators, and valuable contributors.

While the Annals may be said to have been a mirror of contemporaneous surgery, it may be claimed that it has been something more than a mirror to passively reflect what was brought before it. Surely it has exerted a very active influence in moulding surgical thought and directing surgical endeavor as each month it has brought to thousands of active surgeons the record of the methods, achievements, and theories of many of their fellows. In the selection of that which it should present, its influence has always been on the side of reason, of practicability, and of sanity.

The past twenty years has witnessed a wide diffusion of trained surgical knowledge and experience. No longer is special skill limited to a few men in great centres, but everywhere, in State and town and colony, are to be found men of thorough training, of hospital experience, skilled in aseptic technique, with knowledge of pathology and diagnosis and practice, who have arrived on the professional scene since the Annals of Surgery began to do its work. It is into the hands of these men, products and exponents of the new surgery, that the surgical work of the world has either already or will soon come. To record their achievements during the coming twenty years will be a task equally calculated to elicit an editor's enthusiasm as have the conditions of 1885 to 1904.

REVIEWS OF BOOKS.

A Manual of Operative Surgery. By Sir Frederick Treves, Bart. New Edition, revised by the Author and JONATHAN HUTCHINSON, JR. In two volumes, 8vo. Philadelphia and New York: Lea Brothers & Co., 1903.

This book, upon its first publication, was reviewed at length in the Annals of Surgery of March, 1892. The expression of favor which was awarded it by the reviewer of that date has been justified by the popularity with which the profession in general has continued to regard it ever since, notwithstanding the conspicuous merit of other works, occupying the same field, which have also appeared since its publication. After a lapse of twelve years, one is naturally anxious to see what changes its author has felt himself compelled to make in his effort to keep pace with current progress. The periodical literature of these years has been full of novel operative suggestions, and the very great widening of the scope of operative effort which has also marked these years must have taught many lessons that had not yet been learned in 1892; so we turn to this new edition with the expectation of finding in it the matured judgment of the recognized present leader of English surgery upon the operative problems that have occupied the surgical mind during the past twelve years. This expectation requires but little, if any, modification when we read that the main part of the work of revision has been carried out by Mr. Hutchinson; for, although the executive hand has been that of the junior surgeon, we may still assume that the responsible directing head has been that of the senior. Evidence of one of the most characteristic changes in the operative surgery of the period appears as a prelude even to the titlepage itself in the large frontispiece, bearing the legend, "A Modern Operating Theatre ready for Use," which is a picture of one of the operating theatres of the London Hospital. Mr. Treves, in his first edition (Chapter III), said, "Of the operating theatres and operating wards of hospitals it is not necessary to speak." In the new edition, however, several pages of text are devoted to a description of the operating theatre depicted in the frontispiece, to which are added many other cuts showing details of arrangements and apparatus. The change, of which we accept this as one of the evidences, is the increasing tendency of all important operative surgical work to seek hospital conditions for its performance, pari passu with which have gone the efforts of hospital authorities to perfect the surroundings in which this work is to be done. Another change in the beginning of the book attracts our attention, and makes a pleasant impression. It is the elision of the words "scrofula" and "scrofulous" and "strumous" from the book, and the substitution therefor of the words "tuberculosis" and "tuberculous."

In the first edition, mention of the "steam spray" could not be omitted. It had to be discussed even if only for an explanation of the reasons for abandoning its use. In this new edition it is not even mentioned. The chapters on anæsthetics have been omitted altogether. It gave something of a wrench to our preconceived notions of what might be considered as an important operative preliminary not to find any mention of it in the work; neither ether, chloroform, nor anæsthesia are to be found in the index; but neither also do we find any mention of shock as a postoperative condition, nor of the operation of intravenous saline infusion to combat it. Evidently the authors have not considered these subjects as coming within the scope of their work; it would seem, however, that they ought to have a place in a reasonably complete manual of operative surgery.

The chapters on ligation of arteries remain without material change. That department of surgery has not grown as much as some others during the past decennium.

In some of the illustrations of amputations and excisions, the surgeon's cuffs and coat-sleeves, introduced in preantiseptic days, are still in evidence, having escaped the attention of the reviser (pp. 271, 424, 462, 467, 584, 617, 618, 665), copies from Farabœuf.

In the chapters devoted to abdominal operations and to hernia we find the greatest changes; not that any more space is devoted to these subjects in these volumes than formerly, but the substance of the chapters is quite rewritten. Much of that which was on trial fifteen years ago has been definitely accepted, or rejected, or replaced by something better since, so that the present writing well represents the opinion and practice of the best surgeons of to-day. Fewer different methods are described; more attention is given to the principles that should guide the surgeon, and more frequently a definite judgment is rendered as to what in the opinion of the writer is the method of procedure.

A much fuller consideration of the surgery of the appendix vermiformis is given than in the former edition, as is natural, considering the increased importance in the surgical world which has become attached to that anatomical member.

The chapter on excision of the breast in carcinoma has been rewritten. This well illustrates the change in surgical practice that has taken place, and the readiness of the writers to change their opinions and practice. In 1892, the writer said, "The heroic evacuation of the axilla which involves the laying bare of the whole of the axillary vein, the removal of the fatty tissue of the entire space, and the exposure of the upper ribs, has nothing to recommend it." In the preceding paragraph it had been said, "the glands may be most conveniently removed with the fingers"! We detect in this phraseology a lack of sympathy with the teaching, then beginning to come into vogue, that the utmost thoroughness in the systematic removal of possible minute foci of infection in the axilla should be a part of every operation for carcinoma of the breast. But in the present edition this dictum

is accepted in no uncertain terms. After a very just and full statement of the very general axillary gland infection that attends carcinoma of the breast, it is said that "excision of a cancerous breast should always include excision of the axillary lymphatic glands." No slighting allusions now to "heroic" evacuations of the axilla, but an added statement that "if the supraclavicular glands are suspected they also should be removed."

It is not necessary to multiply further examples of the admirable manner in which this revised edition has been made to reflect the most approved work of to-day. The work is more than a hand-book; it is in two sizable volumes; there is much of history and criticism in it, and it will be sure to command the interest and confidence of surgeons for a long time.

LEWIS S. PILCHER.

A. Manual of Surgical Diagnosis. By James Berry, B.S., F.R.C.S., Surgeon to and Lecturer on Surgery at The Royal Free Hospital; formerly Surgical Registrar and Demonstrator of Anatomy, of Operative Surgery and of Practical Surgery at St. Bartholomew's Hospital. Philadelphia: P. Blakiston's Son & Co., 1904.

This compendious book offers its readers eminently practical information of the whys and wherefores essential to making a surgical diagnosis.

The subject-matter is treated of in three parts. The first part is devoted to a consideration of the general principles underlying surgical diagnosis. It opens up with remarks bearing on the taking of a history, and the various modes of physical examination accessory towards establishing the diagnosis.

In the third part attention is directed to the diagnosis of the diseases of the various organs. A few chapters are devoted to the differential diagnosis of a particular symptom-complex, as, "Inability to Open the Mouth, Dysphagia, Abdominal Swelling, Intestinal Obstruction, Pyuria and Hæmaturia, and Aneurism."

The third part is descriptive of the diagnoses of injuries of the body regionally considered.

The commonplace affections, and not the exceptional, are admirably narrated; and, though no concrete examples are presented to further the understanding of making a surgical diagnosis, yet the story is in each instance so tersely and clearly told that the reading of this book at no time becomes a drudgery.

The salient factors in the development of the diagnosis are printed heavily, and this feature, together with the extensive index alphabetically arranged, facilitates reference. Furthermore, the small size of the volume makes it convenient to have about.

This book fills a gap in the literature of surgical text-books. It is not placing our estimate of this valuable book too high to urge its perusal upon every student of medicine who would qualify himself in the art of surgical diagnosis.

MARTIN W. WARE.

CHIRURGIE ORTHOPÉDIQUE. Par Le Professeur Paul BERGER et Le Docteur S. Banzet, Chef du laboratoire de Médecine operatoire à la Faculté de Médecine de Paris. Avec 489 figures dans le texte. Paris: G. Steinheil, Editeur, 2, Rue Casimir-Delavigne, 1904.

The joint authorship has resulted in giving us a very voluminous book replete in all that appertains to orthopædic surgery.

The authors take a conservative stand in the advantages accruing from the application of the knife in orthopædics, and they warmly indorse mechanotherapy.

The subject is considered in three parts,—that of the trunk and the extremities,—and each part is divided into articles, these in turn being treated of in various chapters.

The type is of very large size and printed on heavy paper, widely marginated. The text covers 593 pages, and there are 483 illustrations.

The teachings represent the best accepted methods the world over; but the reader, however, will search in vain for anything novel.

The most recent conquests in the branch of orthopædics—tendoplasty for paralytic affections and coxa vara—are thoroughly handled. The latter is very well elucidated by numerous splendidly executed half-page drawings. The same comment holds good for the chapters on cicatricial contractures.

In connection with the operative procedures for the cure of congenital dislocation of the hip, we have encountered in the perusal of these pages the little recognized method of Broca, who, through an oblique incision traversing the thigh, performs a resection of the great trochanter, thereby widely exposing the head in its misplaced position.

A carefully arranged index and a list of illustrations complete this work.

MARTIN W. WARE.

THE PRINCIPLES AND PRACTICE OF GYNÆCOLOGY. By E. C. DUDLEY, A.M., M.D. Fourth Edition, Revised. Philadelphia and New York: Lea Brothers & Co., 1904.

During the twenty years which have elapsed since the establishment of the Annals of Surgery, the progress of our art in all its branches has been greater than that of centuries previous. Bacteriology was then in its infancy, and the technique, for which we are indebted to Lord Lister, was in process of evolution and struggling for recognition. In gynæcology, the history of the cycle has been the history of modern abdominal surgery. This has been made a possibility, however, by the discoveries of the bacteriologist and their application to the practical problems of the surgeon's art. Thus the birth and growth of a new science opened up new fields of achievement to the surgeon. The literature of a science may fairly be said to mark its progress. So, if we glance over the pages of the standard works on Diseases of Women

published a generation ago and compare them with this the newest work on the subject, we shall appreciate how vast have been the advances in our art since the great Kentuckian, McDowell, blazed a way through the difficulties which up to his day surgeons had considered an impassè. Our plastic surgery differs but little, if at all, from that taught us by the fathers and pioneers of surgery, Syms and Emmet. We have not improved on their methods. The illustration of the text-books of to-day on this subject are far clearer and more illuminating than the crude drawings which obscured the pages of the books of those days, but the principles of the operations are essentially the same. If changes have been made, it is in the matter of minor details, such as suture materials and instruments.

The plastic operations of these old masters have stood the test of twenty years. Twenty years hence not a few operations now fashionable will have been abandoned. Far different, however, are the bold and scientific methods by which we attack the inflammations or those conditions which require the resources of the modern abdominal surgeon. It is interesting to compare the hesitating tentative methods of the older school of gynæcologists in respect to the treatment of pelvic inflammations with that in vogue to-day. A quotation from the Transactions of the Medical . Association of the State of Missouri will serve to illustrate. "About a year ago I was called to see Mrs. V., and found her suffering with a pelvic abscess, from which she soon got relief by its discharging through the bladder." What practitioner would care to make such a statement before a body of medical men, or to acknowledge that he had permitted a pelvic abscess to take care of itself? In one of the standard works published in 1883, all inflammatory affections of the pelvis are classed under the head of pelvic cellulitis. The word pyosalpinx does not occur in the book. Removal of the infected tubes is nowhere even suggested, and not a word is said as to the relation between gonorrhœa and inflammations of the pelvic viscera. Nor ought we to

wonder at this, for it was not until 1885 that Bumm first demonstrated conclusively the pathological rôle played by the organism discovered six years previous by Neisser.

The surgery of the inflammations was of the simplest, and the master of those days rested content if he evacuated the abscess, which he had allowed to point, with the aspirator or a hesitating knife or scissors' blade. Cataplasms, injections, iodide of potassium, tincture of iodine, these were the weapons of the old school. When the pus became so evident that fluctuation could be felt through the thinning vaginal wall, a timid operation was done, unless, indeed, nature had not first anticipated the physician and done a crude operation such as the Missouri doctor relates in the quotation above.

The chapter on pelvic inflammations in the work under review emphasizes the distance between the gynæcologist of to-day and his forbears of a past generation. A correct classification, not only according to the seat of the lesion but its bacteriological relationship, has replaced the crude methods of those times, and our methods of treatment have correspondingly improved. seems strange, in glancing over the text-book of twenty years ago, to find that the only mention made of so important a subject as ectopic gestation is to warn the observer against mistaking it for a cystic tumor of the ovary. We used to hear a good deal about pelvic hæmatocele in those days, both at the clinics and in the didactic lectures on gynæcology. If by chance an ectopic pregnancy was recognized previous to rupture, we were told to use strong currents of electricity to destroy the life of the ovum. We may certainly congratulate ourselves on the advances which surgery has made in the treatment of this the most fatal accident that can occur to an expectant mother. We observe, in comparing the old gynæcology with the new, similar and great differences between the operative treatment of the myomata from that with which we were familiar in our student days. What medical student of to-day has ever even heard of the clay electrodes of Apostoli, much less seen them? We have a number of different

operations for the removal of uterine myomata, all of them with a low death-rate in experienced hands. In the management of the pedicle of the ovarian cyst, the clamps of Spencer Wells and others, designed to secure the stump outside the abdomen, are now consigned to the hospital museum, and the inquiring house staff not seldom come to us and ask us what those things were used for. The operating case of every large hospital has a hundred pounds more or less of such discarded hardware. One might write an interesting and perhaps humorous article on the passing of the pessary. The older works have whole chapters devoted to a description of the various pessaries, and some of the illustrations cause us to wonder at the patience with which the vagina has tolerated all sorts and shapes of foreign bodies designed to sustain a displaced uterus. One in particular, illustrated in an old work, resembles a Chinese puzzle as much as anything else. Emmet tells a story in his work about a man who wished his endorsement for a new pessary; whereupon Emmet showed him a closet which contained between five and six hundred pessaries which he had used on different cases, and promised his endorsement if the petitioner would find any two exactly alike. The man spent the afternoon on the job and gave it up. When we come to sum up the results of the best modern work for the relief of carcinoma of the pelvic organs and compare it with the surgery of malignant disease as it was twenty years ago, we cannot but feel the most intense chagrin. Not that we have not taken every advantage of our improved technique. What have we not done to save from death the sufferer from carcinoma of the cervix? Surgeons have cleaned out the entire pelvis with the exception of the great blood-vessels and the ureters, and still their patients have died of carcinoma. The results of Byrne's cautery operation still challenge modern methods. It has been fashionable to say that the cases which he reported were not cases of cancer, but Byrne was too good a clinician not to know malignant disease when he saw it. The microscope is not always necessary in the diagnosis of carcinoma. We can only hope that at the end of

another twenty years those who are to come after us will have a better record to show in the surgery of malignant disease than is possible to any of the surgeons of the present day. As we peruse the pages of this book, however, we find sufficient reason to congratulate ourselves that while the mystery of the most dreadful scourge of womanhood remains still unsolved, yet our art has made great advances. If there are dark recesses still to be explored, floods of light have been cast upon many phases of disease that were as dark to our fathers as cancer is to us.

ALGERNON T. BRISTOW.

GENITO-URINARY AND VENEREAL DISEASES AND SYPHILIS. A Treatise by Robert W. Taylor, A.M., M.D., Clinical Professor of Genito-Urinary Diseases in the College of Physicians and Surgeons, New York. Third Edition. Octavo, 757 pages. Philadelphia and New York: Lea Brothers & Co., 1904.

This volume treats of Venereal Diseases, Genito-Urinary Surgery, and Syphilis. In the department of Venereal Diseases it is much stronger than in Genito-Urinary Surgery.

Most authorities will take issue with him in regard to the length of time that the gonococci remain in the tissues. It is generally conceded that the germ remains for almost an indefinite period in the tissues, and that is the reason the mucous membrane continues in a diseased condition.

His unqualified condemnation of the use of the albuminates of silver in the treatment of acute gonorrhœa is not borne out in the experience of the vast majority of clinicians.

In the part devoted to the surgery of hypertrophied prostate, the author mentions only the suprapubic method of enucleation, and no mention is made of the different operations by the perineal route, now almost universally employed.

In the discussion of Syphilis, the author is at his best. He is clear, concise, and able. The value of this one subject alone would be sufficient inducement to purchase the book.

HOMER E. FRASER.

INDEX TO VOLUME XL.

Α

Abdomen, Perforating gunshot wound of the, 255.

Abdominal crises caused bv Meckel's diverticulum, 742; injuries followed by parotitis, 886; muscles, Severe laceration of the. 291; operations followed by pulmonary complications, 149; viscera, Wounds of, complicating wounds of the chest, 675; wall, Adenoma of sebaceous glands of, 486; wall. Severe laceration of the, 414: wall suture, Results in, 373, 439

Acoustic nerve, neurofibroma of, Surgery of, 293.

ALBERT, FREDERICK, Primary sarcoma of the spleen, 80.

ALESSANDRI, ROBERTO, Divulsion in cesophageal stricture, 870.

Allen on Radiography and Phototherapy, Review of, 769.

Anastomosis button, Jaboulay's 282.

Andrews, E. Wyllys, Abdominal wall suture, 440.

Annals of Surgery, 1885-1904, Historical Review of, 1028.

Antitoxin, Intraneural and spinal injections of, for tetanus, 417, 759.

Appendicectomy, Treatment of the stump in, 710.

Appendicitis associated with perforating duodenal ulcer, 447; Clinical notes on, 291; excision followed by intestinal obstruction, 122; operations, Posterior incision in, 376; Remarks on, 727, 761.

Appendix, Inflamed, in sac of femoral hernia, 380; vermiformis concealed in the postcæcal retroperitoneal space, 721; congenital inversion of the, 1015.

Arteries, wounds of, New method for closing, 856, 1026.

Asepsis, Studies in, 475.

Aseptic surgical technique, 453, 464. ATHERTON, A. B., Operative treatment of perforating gastric ulcer, 686.

R

Baldwin, James Fairchild, Formation of an artificial vagina by intestinal transplantation, 398.

Base of the skull, Fracture of the, 654.

Beck on Röntgen Ray Diagnosis and Therapy, Review of, 156.

BERG, ALBERT ASHTON, Transverse ectopy of the testis, 223; Radical operation for malignant neoplasm of the urinary bladder, 382.

Berger-Banzet, Chirurgie Orthopédique, Review of, 1037.

Bergmann's Surgery, edited by William T. Bull, Vols. ii and iii, Review of, 450.

Berry's Surgical Diagnosis, Review of, 1036.

Besley, Frederick A., Nephrectony for pyonephrosis, 289.

BEVAN, ARTHUR DEAN, Metapneumonic empyema, 436.

Birth-fracture of skull, 865.

Bladder, urinary, Hernia of, complicating inguinal hernia, 921; radical operation, Carcinoma of, 261, 382; Rupture of the, 271.

Blastomycetic growth associated with bacillus pyocyaneus septicæmia, 613.

Bougie in retroperitoneal space, 126.

Brachial artery, Suture of the, 107. Brain, Traumatic abscess of, 650; tumors, Proposal how to reach tumors of the chiasm, 35.

Breast, cancer of, Operative treatment of, 805.

Brewer, George E., Indications for cholecystectomy, 131; enterostomy for hæmatemesis, 263; Intracranial neurectomy for facial neuralgia, 264; Stone in the pelvic ureter, 586, 588; Adenoma of accessory thyroid, 590; Postoperative intestinal obstruction, 599; New method for closing wounds in large arteries, 856, 1027; Acute hæmatogenous infection of the kidney, 1010; Papilloma of trachea, 1012; Congenital inversion of the appendix, Result of removal of 1015; sternocleidomastoid muscle, 1019. Bronchus, foreign body in, Re-

moval of, by electro-magnet, 358. Brown, F. Tilden, Ruptured bladder, 271; Posterior wall gastric ulcer, 419.

Bullet wounds, Modern, 834. Bunts, Frank E., Meckel's diverticulum, 536.

Burrell-Blake, Case Teaching in Surgery, Review of, 452.

C

Carcinoma, Morphology and etiology of, 773; of breast, Operative treatment of, 805.

Carotids, Ligature of both external, 257, 269; Ligation of both common, 669.

Cerebrum, Traumatic abscess of, 650.

Cervical ribs, 437.

Cheek, Carcinoma of, 601.

Chest, Penetrating wounds of the, 675.

Chiasm, tumors of the, Proposal how to reach by operation, 35, 124.

CHICAGO SURGICAL SOCIETY, TRANSACTIONS OF THE, 288, 436, 601.

Cholecystectomy, Primary, 44, 128, 129, 134; and choledochotomy, 593.

Cholecystotomy, 134.

Choledochotomy for chronic cholangeitis, 412.

CLARK, WILLIAM COGSWELL, Adenoma of sebaceous glands of the abdominal wall, 486.

Cleft palate, 265.

Coley, William B., Inguinoperitoneal hernia, 126; Gastro-enterostomy for hæmatemesis, 264; Metastases in cases of lymphosarcoma of the neck, 267; Results of treatment of sarcoma, 268, 1019.

Collinson, Mr., gastro-enterostomy, Effects of, in gastric ulcer, 435.

Congenital deformity of extremity, 120.

Connell, F. Gregory, Treatment of hæmatemesis by gastro-enterostomy, 500.

COOPER, C. M., Value of peroxide of hydrogen in diagnosis of rodent ulcers, 160.

D

DAVIS, GWILYM G., Gangrene of gall-bladder, 431.

DAVIS, THOMAS A., and D. J., Osteomalacia in the male, 225, 288. DAVISON, CHARLES, Results in abdominal wall suture, 373, 439, 441.

DAWBARN, ROBERT H. M., Treatment of malignant growths by starvation, 269; Results of excision of middle third of both sternocleidomastoid muscles, 1018; Method of tamponing the nares, 1021; closing wounds of the larger arteries, 1026.

Deaver, John B., Advantages of abdominal over vaginal hysterectomy in carcinoma, 135; Preservation of body-heat during operations, 153; Strangulation of fimbriated extremity of Fallopian tube in sac of femoral hernia, 154.

Dermoids of the pelvic connective tissue, 929.

Diaphragm, Perforating wounds, associated with chest wounds, 675.

Down, Charles N., Cleft palate, 265; Nephrectomy for sarcoma, 595; Postoperative intestinal obstruction, 599.

Dudley's Gynæcology, Review of, 1038.

Duodenal ulcer, 900; Perforating, associated with appendicitis, 447. Dyball, Brennan, Parotitis after abdominal injuries, 886.

E

EASTMAN, JOSEPH RILUS, Bacillus pyocyaneus septicæmia, 613.

ECKLEY, WILLIAM T., Congenital and infantile omentocele on the same side, 204.

Ectopy, Transverse, of the testis, 223.

EISENDRATH, DANIEL N., Severe laceration of the abdominal muscles, 291; Adenoma of the mucous glands of the lips as a cause of macrocheilia, 320, 438; Cervical rib, 437; Pseudo-atlanto-axoid dislocation, 438; Abdominal wall sutures, 439.

Electric heating-pads, Use of, during operations, 152, 154.

ELIOT, ELLSWORTH, JR., Intestinal obstruction following operation for appendicitis, 124.

ELSBERG, CHARLES A., Surgical procedure in cases of neuro-fibroma of the acoustic nerve, 311.

Empyema, Metapneumonic, 436.

ERDMANN, JOHN F., Perforating ulcer of the pylorus, 266; Intestinal resection, Postoperative obstruction, Repeated resection with final recovery, 584; Postoperative intestinal obstruction, 598; Erysipelas and bacillus prodigiosus toxins in the treatment of sarcoma, 268, 1019; Papilloma of larynx and trachea, 1014.

Exostosis bursata of femur, 413.

F

Facial neuralgia treated by intracranial neurectomy, 264.

Fallopian tube, Fimbriated extremity of, strangulated in sac of femoral hernia, 154.

Femur, neck of, Union of ununited fractures of, by open operation, 561, 606; Pathological fracture of, 121; Fracture of lower end of, with vicious union, 1022.

Ferguson, Alexander Hugh, Treatment of fractures of the neck of the femur, 609.

Fowler, Harry Atwood, Stone in the lower ureter, 943.

FOXWORTHY, FRANK W., modern bullet wounds, 834.

Fracture, Pathological, of femur,

FRAENKEL, JOSEPH, Contribution to the surgery of neurofibroma of the acoustic nerve, 293.

FRANK, JACOB, Congenital and infantile omentocele on same side, 204.

Freeman, Leonard, Union of ununited fractures of neck of femur by open operation, 561, 606.

G

Galactocele, 275.

Gall-bladder, Acute inflammation of, with gall-stones, in a girl of seventeen, 430; Gangrene of, in a man of seventy, 431; Primary excision of, 44, 128, 129, 134; Rupture of, 44; followed by profound toxemia, 424, 425; without general toxic symptoms, 427; Slough of, associated with intestinal obstruction, 133.

Gall-duct, common, Calculi in, 593. Gastric lavage, postoperative, Value of, 612; tetany and foreign bodies in the stomach, 909; ulcer on posterior wall, 419; Perforated, 116, 266; operative treatment of, 686.

Gastro-enterostomy, posterior, Technique of, 357; Moynihan's clamp and split-eyed needles for use in, 424; for carcinoma, Specimen of, 285; for hæmatemesis, 500.

Gastro-intestinal anastomoses, Use of the segmented ring in, 748.

Gastroplication for dilatation of the stomach, 279.

Gastrotomy for hatpin swallowed by an infant, 354.

Genito-Urinary Diseases, Taylor, Review of, 1042.

GERMAIN, HARRY H., Pelvic connective-tissue dermoids, 929.

GIBBON, JOHN H., Effects of air introduced into veins during saline infusions, 154; Hernia, left femoral, containing cæcum, appendix, and colon, with omentum, 154; Treatment of dilatation of the stomach, 281; Effects of bile in peritoneal cavity, 431; Ulcer

of stomach relieved by gastroenterostomy, 432.

GIBSON, CHARLES L., Remarks on primary cholecystectomy, 129; Gall-stone wrapped in iodoform gauze, 133; Slough of gall-bladder, associated with intestinal obstruction, 133; Recurrent villous carcinoma of bladder, 261.

Glanders in the human subject, Report of a case of laboratory origin, 109.

Goitre, Lingual, 323.

Gould's Elements of Surgical Diagnosis, Review of, 451.

Gout simulating myositis ossificans, 605.

GRAHAM, D. W., Appendicitis with perforation of the duodenum, 447.

Gynæcological Pathology, Orthmann's Hand-Book of, Review of, 451.

Gynæcology, Dudley's, Review of, 1038.

H

Hæmatemesis, Gastro-enterostomy for, 263; Treatment of, by gastro-enterostomy, 500.

Hancock, John C., Appendix vermiformis concealed in the postcæcal retroperitoneal space, 721.

HARRINGTON, CHARLES, Some studies in asepsis, 475.

HARRINGTON, FRANCIS B., Use of the segmented ring in gastric and intestinal anastomoses, 748.

HARRIS, MALCOLM L., Osteomalacia, 288.

HARSHA, WILLIAM M., Abdominal wall suture, 440.

HARTE, RICHARD H., Preservation of body-heat during operations, 152; Effects of gastro-enterostomy in gastric ulcer, 435.

HARTWELL, JOHN A., Resection of knee for tuberculosis, 125; Retroperitoneal abscess, 415; Remarks on appendicitis, 764; Stricture of the esophagus, 1020; Fracture of lower end of femur, with vicious union, 1022; Amputation of shoulder-girdle, 1023.

HAWKES, FORBES, Lymphosarcoma of the neck, 266.

HAYNES, IRVING S., Splenectomy for traumatic rupture of the spleen, 114.

HEARN, W. Joseph, Effects of bile in peritoneal cavity, 431.

Hernia, femoral, Inflamed appendix in sac of, 380; Gangrenous inguinal, 119; Inguinal, containing pedunculated fibroid of uterus, 155; Inguinoperineal, 126; Left femoral, containing appendix vermiformis, cæcum, and entire colon, 154; of bladder complicating inguinal hernia, 921; of the uterus through the inguinal canal, 98, 154.

HESSERT, WILLIAM, Resection of four feet of small intestine for injury done during currettage of uterus, 443; Carcinoma of head of pancreas, 445; Amæbic abscess of the liver, 448.

Hip, Double traumatic dislocation of the, 735.

HOLDING, ARTHUR F., Removal by gastrotomy of a hatpin swallowed by an infant, 354.

Hollow viscera, Gangrene of the, 364.

HOLMES, BAYARD, Clinical notes on appendicitis, 291.

HOPKINS, W. BARTON, Multiple loose bodies in the knee-joint, 142; Fracture of spine, prostatic calculus, 143.

Hosmer, Andrew J., Use of an electro-magnet for removal of a foreign body from a bronchus, 358.

Horchess, Lucius W., Indications for cholecystectomy, 131.

Hunt, J. Ramsay, Contribution to the surgery of neurofibroma of the acoustic nerve, 293.

HUTCHISON, J. ALEXANDER, Treatment of fracture of the patella, 571.

Hydrogen peroxide as a diagnostic help, 160.

Hypernephroma of kidney, 1005. Hysterectomy, Advantages of abdominal over vaginal, in carcinoma, 135.

T

Ileum, Fibro-adenoma of, 1008. Incision in laparotomy, The combined transverse and longitudinal, 178, 259.

Inguinoperineal hernia, 126; interscapulothoracic amputation, 1024. Intestinal anastomoses, Use of the segmented ring in, 748; forceps, 272; obstruction, Postoperative, 510, 584, 598; obstruction following operation for appendicitis, 122; obstructions due to adhesions about a sloughing gall-bladder, 133; resection, Repeated, with final recovery, 584; stenosis, New operation for, 689; transplantation for formation of artificial vagina, 398.

Intestine, Excision of, for gangrenous hernia, 119; Resection of loop of, for injury done during curettage of uterus, 443: Fibroadenoma of small, 1008.

Intestines, Gangrene of, 364; Gunshot wound of the, 255.

Intracranial neurectomy for facial neuralgia, 264.

Intussusception of Meckel's diverticulum, 796.

J

Jaboulay's anastomosis button, 282. Jejunum, Septic ulcer of the, 186. Jerson, William, Primary sarINDEX.

coma of the spleen, splenectomy, 80.

Jopson, John Howard, Hernia of the uterus through the inguinal canal, 98, 154; Rupture of gallbladder with profound toxemia, 424, 431.

K

KAMMERER, FREDERICK, cholecystectomy, Cases of, 128, 130; Nephrectomy for tumor of kidney, 260; Volvulus of parovarian cyst, 260; Excision of bladder for carcinoma, 263; Gastro-enterostomy for hæmatemesis, 263; Lymphosarcoma, 267; Nephrectomy for sarcoma, 597; Plastic operation for restoration of lower lip, 598.

KEEN, WILLIAM W., Galactocele, 275; Gastroplication for dilatation of stomach, 279; Jaboulay's anastomosis button, 282; Sprainfractures, 285; Dislocation of semilunar cartilage of knee-joint, 285.

KEENE, THOMAS VICTOR, Bacillus pyocyaneus septicæmia, 613.

KENERSON, VERTNER, Gangrene of the hollow viscera, 364.

Kidney abscess, Nephrectomy for. 289; Hypernephroma of, 1005; movable, Unsuspected lesions of, discovered during nephropexy, 215; sarcoma of, Nephrectomy for, 595; Tumor of, removed by nephrectomy, 260; Acute hæmatogenous infection of, 1010.

KILIANI, OTTO T. G., Remarks on tumors of the chiasm, 35, 124; Cholecystotomy, 134; Cholecystectomy, 134.

Knee-joint, Dislocation of semilunar cartilage of the, 285; Internal derangements of the, 1; Lipoma arborescens of, 605; loose body in, Removal of, 141; Resection of, for tuberculosis, 125.

Koenig's Lehrbuch der speciellen Chirurgie, Eighth Edition, Review of, 768.

L

Laparotomy, The combined transverse and longitudinal incision in, 178, 259.

Larynx, Papilloma of the, 1014. Lavage, Gastric, in the treatment of postoperative vomiting, 194; gastric, postoperative, Value of, 612

LE CONTE, ROBERT, Gastroplication, 281; Rupture of gall-bladder in acute cholecystitis, 427; Rupture of bile duct subsequent to cholecystotomy, 429; Relation of kidneys to toxic symptoms in cholemia, 432.

Lewis, James H., Double traumatic iliac dislocation of the hip, 735.

LIPMAN,, E., Bacteriæmia in cases of gall-bladder disease, 131.

LILIENTHAL, HOWARD, Primary cholecystectomy, 44, 129, 132; Surgical engines for cranial operations, 125; Bougie in retroperitoneal space, 126; Stone in the pelvic ureter, 589; Nephrectomy for sarcoma, 597; Postoperative intestinal obstruction, 599; Remarks on appendicitis, 762; Acute hæmatogenous infection of the kidney, 1012.

Lingual goitre, 323.

Lip, lower, Plastic operation for restoration of, 598.

Lipoma arborescens of knee, 605. Lips, Adenoma of the mucous glands of the, as a cause of macrocheilia, 320, 438.

Liver, Amæbic abscess of, 448.

LYDSTON, G. FRANK, Contribution to the surgery of the deep ure-thra, 555.

Lymphosarcoma of the neck, 266.

M

MACEWEN, J. A. C., Purulent mastoiditis, 348.

Macrocheilia due to adenoma of the mucous glands of the lips, 320, 438.

Magnet, Use of, for removal of foreign body from bronchus, 358. Mastoiditis, Purulent, 348.

Mathews, Frank S., Physiological salt solution, 243; Pneumococcus peritonitis, 698.

MAYO, WILLIAM J., Duodenal ulcer, 900.

McCosh, Andrew J., Observations on the results in 125 cases of sarcoma, 161, 268; Extirpation of bladder for carcinoma, 262; Acute hæmatogenous infection of the kidney, 1012.

McGraw, Theodore A., New operation for intestinal stenosis, 689.

McReynolds, R. P., Pulmonary complications following abdominal operations, 149.

Meckel's diverticulum, 536; Abdominal crises caused by, 742; Intussusception of, 796.

Medical Diagnosis, Treatise by John H. Musser, M.D., Review of, 770.

Mellish, Ernest J., Total avulsion of the scalp, 644.

Mesosigmoiditis and its relations to recurrent volvulus of the sigmoid flexure, 523.

Metacarpal fracture and subluxation, 283.

MEYER, WILLY, Cholecystectomy, 130; Value of cautery in advanced carcinoma of parotid, 258; Excision of rectum for carcinoma, 411; Choledochotomy for chronic cholangeitis, 412; Exostosis bursata of femur, 413.

Monks, George H., Aseptic surgical technique, 464.

Moynac's Éléments de Pathologie

et de Clinique Chirurgicales, Review of, 769.

MOYNIHAN, B. G. A., Points in suprapubic prostatectomy, 159.

Musser's Treatise on Medical Diagnosis, Review of, 770.

Myositis ossificans simulated by gout, 605.

N

Neck, Lymphosarcoma of the, 266. Nephrectomy for sarcoma, 595.

Nerve defects, The bridging of, 632.

Neuromata, Multiple, of arm, 422. New York Surgical Society, Transactions of the, 114, 125, 255, 261, 411, 571, 759, 1010.

NICOLL, JAMES H., Birth-fractures of skull, 865.

O

OCHSNER, ALBERT J., Aseptic surgical technique, 453; Treatment of fractures of the neck of the femur, 608; Closure of abdominal wounds, 439.

ODIORNE, WALTER B., Undescended testicle, 962.

Esophageal stricture, Divulsion in, 870, 1020.

Omentocele, Congenital and infantile, on same side, 204.

Omentum, great, Torsion of entire, 916.

Operative Surgery, Treves, Review of, 1033.

ORTH, JOHANNES, Morphology of carcinoma, and the parasitic theory of its etiology, 773.

Orthmann's Hand-Book of Gynæcological Pathology, Review of, 451.

Orthopædic Surgery, Berger-Banzet, Review of, 1037.

Osteomalacia in the male, 225, 288. Osteomyelitis, Acute, 602.

P

Pancreas, Carcinoma of head of,

Parotid, Recurrent carcinoma of the, 257.

Parotitis after abdominal injuries, 886.

Patella, Treatment of fracture of, 571.

Pathologie et de Clinique Chirurgicales, Éléments de, par le Dr. Leon Moynac, Review of, 769.

PECK, CHARLES H., Perforated gastric ulcer, 116; Gangrenous strangulated hernia, 119; Intestinal obstruction following operation for appendicitis, 123; Retropharyngeal sarcoma, 270; Severe laceration of the abdominal wall, 414; Postoperative intestinal obstruction, 510, 598; Calculi in the common duct, 593; Remarks on appendicitis, 764.

Pelvic connective-tissue dermoids, 929.

Peptic ulcer of the jejunum, 186. Periosteum, Fibroma of, 604.

Peritonitis due to pneumococcus, 698.

PHILADELPHIA ACADEMY OF SUR-GERY, TRANSACTIONS OF THE, 135, 273, 422.

Pneumococcus peritonitis, 698.

Powers, Charles A., The bridging of nerve defects, 632.

Pringle, J. Hogarth, Repair of the urethra by transplantation of the urethra of animals, 387.

Progressive Medicine, Vol. VI, No. 1, Review of, 157.

Prostate, Calculus of, sequel to fracture of the spine, 143; Surgery of the hypertrophied, 782.

Prostatectomy, suprapubic, Points in, 159.

Pulmonary complications following abdominal operations, 149.

Pyloric spasm, with resultant dilatation of the stomach, 201.

Pylorus, Perforating ulcer of the, 266.

Pyocyaneus bacillus septicæmia, 613.

Q

Quadriceps extensor tendon, Rupture of the, 273.

R

Radiography and Phototherapy, by Charles W. Allen, Review of, 769.

Radius, Fracture of the lower end of the, 284; Fracture of the lower extremity of, with anterior displacement of lower fragment, 423.

REBERT, MICHAEL A., Primary spasm and hypertrophy of pyloric sphincter, and resultant dilatation of the stomach, 201.

Rectum, Excision of, for carcinoma, 411.

Retroperitoneal abscess, 415.

Retropharyngeal sarcoma, 270.

RIES, EMIL, Mesosigmoiditis, and its relations to recurrent volvulus of the sigmoid flexure, 523.

ROBERTS, JOHN B., Osteophyte of femur mistaken for movable body in knee-joint, 142; Post-orbital gunshot wound of skull, 148; Pulmonary complications after abdominal operations, 151; Fracture of lower extremity of radius with anterior displacement of lower fragment, 423.

ROBINSON, ERNEST F., Traumatic abscess of the cerebrum, 650.

Robson, A. W. Mayo, Peptic ulcer of the jejunum, 186.

RODMAN, WILLIAM L., Galactocele, 278; Gastroplication, 280.

Rogers, C. C., Abdominal wall suture, 440.

ROGERS, JOHN, Intestinal obstruction following operation for appendicitis, 122; Acute tetanus treated by intraneural and spinal injections of antitoxin, 417, 759; Remarks on appendicitis, 763, 766.

Röntgen-Ray Diagnosis and Therapy, Review of Beck on, 156.

Ross, George G., Results of X-ray examinations of wrist injuries, 284.

RUSHMORE, JOHN D., Intestinal forceps, 272; Use of electricity in skin-grafting, 404; Remarks on appendicitis, 765, 767.

S

Salt solution, Physiological, 243.
Sarcoma, Results in 125 cases of, 161, 268; of chest wall cured by injections of mixed toxins, 1019.
Scalp, Total avulsion of the, 644.
Scudder, Charles L., Details of the technique of posterior gastroenterostomy, 357; Torsion of entire great omentum, 916.
Sebaceous glands of abdominal

Sebaceous glands of abdominal wall, Adenoma of, 486.

Seelig, M. G., Treatment of the stump in appendicectomy, 710. Semilunar cartilage of knee, Dislo-

cation of, 285.

SENN, NICHOLAS, Carcinoma of cheek, 601; Multiple tubercular abscesses, 602; Acute osteomyelitis, 602; Cysts of the ductus thyroglossus, 603; Fibroma of periosteum, 604; Verruca senilis, 604; Gout simulating myositis ossificans, 605; Lipoma arborescens of knee, 605; Treatment of ununited fractures of neck of femur, 606.

SHANDS, AURELIUS RIVES, Inflamed appendix in sac of femoral hernia, 380.

Sheldon, John G., Posterior incision in certain appendicitis operations, 376.

SHEPHERD, FRANCIS J., Hernia of bladder complicating inguinal hernia, 921.

SHOEMAKER, GEORGE ERETY, Subluxation and fracture affecting carpometacarpal joint, 283; Fracture of the lower end of the radius, 284.

Shoulder-girdle amputation, 1023.

SIMMONS, CHANNING C., Undescended testicle, 962.

Singley, John D., Value of postoperative gastric lavage, 612.

SITER, E. HOLLINGSWORTH, Acute cholecystitis, with gall-stones in a girl of seventeen, 430.

Skin-grafting, Use of electricity in, 404.

Skull, Perforating gunshot wound of the, 143, 148; base of, Fracture of, 654; Birth-fractures of, 865.

SMITH, OLIVER C., Abdominal crises caused by Meckel's diverticulum, 742.

Spellissy, Joseph, Use of electric heating-pads during operations, 152.

Spine, Fractures of the, 258, 265; followed by formation of enormous prostatic calculus, 143.

Spleen, Primary sarcoma of, Splenectomy, 80; Traumatic rupture of the, 114.

Splenectomy, 80, 114.

Starvation treatment of malignant growths, 269.

Sternocleidomastoid muscles, Result of excision of middle third of both, 1018.

STEWART, FRANCIS T., Multiple neuromata of the arm, 422; Fracture of lower extremity of radius with anterior displacement of lower fragment, 423; Toxæmia following operations for cholecystitis, 430.

Stewart, George D., Remarks on appendicitis, 763.

STEWART, J. CLARK, Pyæmic glanders in the human subject, Report of a case of laboratory origin, 109.

STIMSON, LEWIS A., The combined transverse and longitudinal incision in laparotomy, 178, 259; Gunshot wound of the intestines, 255.

Stomach carcinoma, gastro-enterostomy for, Specimen showing result of, 285; Dilatation of, from primary spasm of pylorus, 201; dilatation, Gastroplication for, 279; Foreign bodies in the, 909; hæmorrhage, Gastro-enterostomy for, 263; Perforated ulcer of the, 116, 266, 686; Ulcer of, on posterior wall, 419; Ulcer of, relieved by gastro-enterostomy, 432.

Stone in the pelvic ureter, 586, 588. STORRS, HENRY R., Lingual goitre, 323.

Surgery, Case Teaching in, by Burrell and Blake, Review of, 452.

Surgery, Von Bergmann's, Edited by William T. Bull, Review of, 450.

Surgical Diagnosis, Berry, Review of, 1036; Pearce Gould's Elements of, Review of, 451.

Surgical engines for cranial operations, 125; technique, Aseptic, 453, 464.

SYMS, PARKER, Remarks on appendicitis, 727, 761.

т

Taylor, Frank E., Unsuspected lesions in movable kidneys discovered during nephropexy, 215.

Taylor, William J., Protest against vaginal hysterectomy for carcinoma, 140; Multiple neuromata of the leg, 422; Moynihan's clamps and split-eyed needles for use in gastro-enterostomy, 424; Rupture of gall-bladder followed by profound toxemia, 425, 430.

Taylor on Genito-Urinary Diseases, Review of, 1042.

Tenney, Benjamin, Anatomy and surgery of the internal derangements of the knee-joint, i.

Testicle, Undescended, 962.

Testis, Transverse ectopy of the, 223.

Tetanus, Acute, treated by intraneural and spinal injections of antitoxin, 417, 759.

Tetany, Gastric, 909.

THOMAS, T. TURNER, Ligation of both common carotid arteries, 669.

Thyroglossal duct, Cysts of the, 603.

Thyroid, accessory, Adenoma of, causing marked stenosis, 590.

Tibial tubercle, Fracture of the, 739.

TILTON, BENJAMIN T., Excision of carcinoma of the parotid, 257; Combined transverse and longitudinal incision in laparotomy, 260; Remarks on appendicitis, 764.

TORRANCE, GASTON, Suture of the brachial artery, 107.

Torsion of entire great omentum, 916.

Trachea, Stenosis of, due to adenoma of an accessory thyroid, 590; Papilloma of, 1012, 1014.

Treves's Operative Surgery, Review of, 1033.

Tubercular abscesses, Multiple, 602. Tuberculosis of knee-joint, Resection, 125. U

Ununited fractures of neck of femur, Union of, by open operation, 561, 606.

Ureter, lower, Stone in the, 943; pelvic, Stone in, 586.

Urethra, deep, Contribution to the surgery of, 555; Repair of, by transplantation of the nrethra of animals, 387.

Uterus, Advantages of removal by abdominal over vaginal route in carcinoma, 135; Hernia of, through the inguinal canal, 98, 154.

V

Vagina, artificial, Formation of, by intestinal transplantation, 398. Verruca senilis, 604.

Volvulus of parovarian cyst, 260; of sigmoid flexure, Mesosigmoiditis, and its relations to recurrent, 523; of omentum, 916.

Vomiting, postoperative, Treatment of, by gastric lavage, 194.

W

Wagner, Carl, Abdominal wall suture, 440.

Walker, John B., Fatal hæmorrhage after gall-bladder operations, Cases of, 131.

Walton, George L., Fracture of the base of the skull, 654.

WARBASSE, JAMES P., Gastric tetany and foreign bodies in the stomach, 909.

WARE, MARTIN W., Fracture of the tibial tubercle, 739.

Warren, J. Collins, Operative treatment of cancer of the breast, 805.

Warts of the aged, 604.

Watson, Francis S., Hypernephroma of the kidney, 1005; Fibroadenoma of inner wall of ileum, 1008.

WHARTON, HENRY R., Removal of loose body from the knee-joint, 141; Danger of electric mattress during operations, 154; Uterine fibroid in sac of inguinal hernia, 155; Rupture of the quadriceps extensor tendon, 273.

WHITE, CHARLES S., The treatment of postoperative vomiting by gastric lavage, 194.

WHITE, J. WILLIAM, Present status of the surgery of the hypertrophied prostate, 782.

WHITMAN, ROYAL, Congenital deformity of extremity, 120; Pathological fracture of femur, 121; Fracture of the spine, 258, 265.

WILLIAMS, DANIEL H., Penetrating wounds of the chest, diaphragm, and abdominal viscera, 675.

Wood, Alfred C., Specimen of gastro-enterostomy for stomach carcinoma, 285.

Woolsey, George, Surgical procedure in cases of neurofibroma of the acoustic nerve, 303; Endothelial tumors of the neck, 270.

Wrist injuries, Results of X-ray examinations in cases of, 284.

Y

Young, James K., Cases of loose body in the knee-joint, 142; Use of electric heating-pads during operations, 154; Multiple neuromata of the arm, 422.



FORTIETH ANNIVERSARY NUMBER

ANNALS

OF

SURGERY

A MONTHLY REVIEW OF SURGICAL SCIENCE AND PRACTICE.

EDITED BY

LEWIS STEPHEN PILCHER, M.D., LL.D.,

OF NEW YORK,

Surgeon to the Methodist Episcopal Hospital and to the German Hospital in Brooklyn.

WITH THE COLLABORATION OF

J. WILLIAM WHITE, Ph.D., M.D., SIR WILLIAM MACEWEN, M.D., LL.D. OF PHILADELPHIA, OF GLASGOW, Professor of Surgery in the University of Pennsylvania.

OF GLASGOW, Glasgow.

W. WATSON CHEYNE, C.B., F.R.S., of LONDON,
Professor of Surgery in King's College.

VOLUME XL. JULY-DECEMBER, 1904.

J. B. LIPPINCOTT COMPANY
1904.

COPYRIGHT BY

J. B. LIPPINCOTT COMPANY

1904.

CONTRIBUTORS TO VOLUME XL.

ALBERT, FREDERICK, M.S., M.D., Professor of Pathology, State University of Iowa.

ALESSANDRI, ROBERTO, M.D., of Rome, Italy, Professor of Pathological Surgery in the University of Rome; Chief Surgeon of the Third Division in the Policlinico Umberto I.

ATHERTON, A. B., M.D., of Fredericton, New Brunswick, Canada.

BALDWIN, JAMES FAIRCHILD, M.D., of Columbus, Ohio, Surgeon-in-Chief to Grant Hospital.

Berg, Albert Ashton, M.D., of New York City, Adjunct Surgeon to Mount Sinai Hospital.

Brewer, George Emerson, M.D., of New York, Professor of Clinical Surgery in the College of Physicians and Surgeons.

BUNTS, FRANK E., M.D., of Cleveland, Ohio, Professor of Surgery in the Western Reserve University; Surgeon to St. Vincent's Hospital.

CHEYNE, W. WATSON, C.B., F.R.S., of London, Surgeon to King's College Hospital.

CLARKE, WILLIAM COGSWELL, M.D., of New York.

CONNELL, F. GREGORY, M.D., of Salida, Colorado, Attending Surgeon, Denver and Rio Grande Railroad Hospital; Consulting Surgeon to St. Vincent's Hospital, Leadville.

DAVIS, D. J., M.D., of Chicago, Fellow in Pathology in Rush Medical College.

DAVIS, THOMAS A., M.D., of Chicago, Professor of Surgery in the College of Physicians and Surgeons.

DAVISON, CHARLES, M.D., of Chicago.

Dyball, Brennan, M.B., B.S., F.R.C.S., of Exeter, England.

EASTMAN, JOSEPH RILUS, M.D., ot Indianapolis.

ECKLEY, WILLIAM T., M.D., of Chicago, Professor of Anatomy, School of Medicine, University of Illinois.

EISENDRATH, DANIEL N., M.D., of Chicago, Adjunct Professor of Surgery, College of Physicians and Surgeons; Attending Surgeon, Cook County Hospital, Chicago.

ELSBERG, CHARLES A., M.D., of New York, Adjunct Surgeon, Mount Sinai Hospital.

FOXWORTHY, FRANK W., M.D., of Indianapolis, Ex-Captain and Assistant Surgeon, 160th Indiana Volunteers, 34th United States Volunteers, and Acting Assistant Surgeon, United States Army.

Fowler, Harry Atwood, M.D., of Washington, D. C.

STIMSON, LEWIS A., M.D., of New York, Surgeon to the New York Hospital.

STORRS, HENRY R., of Brookline, Mass.

SYMS, PARKER, M.D., of New York, Surgeon to the Lebanon Hospital.

TAYLOR, FRANK E., M.B., F.R.C.S., of London, Pathologist to Chelsea Hospital for Women.

Tenney, Benjamin, M.D., of Boston, Formerly Instructor in Anatomy, Harvard Medical School, and Surgeon to Out-Patients, Boston City Hospital; Assistant Surgeon, Boston Dispensary.

THOMAS, T. TURNER, M.D., of Philadelphia, Assistant Surgeon to the Philadelphia Hospital.

TORRANCE, GASTON, M.D., of Birmingham, Alabama, Surgeon to St. Vincent's Hospital.

WARBASSE, JAMES P., M.D., of New York, Surgeon to the German Hospital, Brooklyn.

WARE, MARTIN W., M.D., of New York, Attending Surgeon, Good Samaritan Dispensary; Adjunct Surgeon, Genito-Urinary Department, Mount Sinai Hospital; Instructor Surgery, Post-Graduate Medical School.

WARREN, J. COLLINS, M.D., Hon. F.R.C.S. (Eng.), of Boston, Massachusetts, Professor of Surgery in Harvard University.

Walton, George L., M.D., of Boston, Massachusetts, Physician to Neurological Department, Massachusetts General Hospital; Instructor in Neurology, Harvard University.

WATSON, FRANCIS S., M.D., of Boston, Massachusetts, Surgeon to the Boston City Hospital.

WHITE, CHARLES S., M.D., of Washington, D. C., House Surgeon in the Emergency Hospital; Instructor in Physiology in the Columbian Medical School.

WHITE, J. WILLIAM, M.D., of Philadelphia, John Rhea Barton Professor of Surgery in the University of Pennsylvania.

WILLIAMS, DANIEL H., M.D., of Chicago, Attending Surgeon to the Cook County and Provident Hospitals.

Woolsey, George, M.D., of New York, Professor of Anatomy and Clinical Surgery in the Cornell University; Surgeon to Bellevue Hospital.

LISTERINE

A non-toxic antiseptic of known and definite power, prepared in a form convenient for immediate use, of ready dilution, sightly, pleasant, and sufficiently powerful for all purposes of asepsis. These are advantages which Listerine embodies.

The success of Listerine is based upon merit, and the best advertisement of Listerine is—Listerine.

LISTERINE DERMATIC SOAP

(For use in the Antiseptic Treatment of Diseases of the Skin)

Listerine "Dermatic" Soap contains the essential antiseptic constituents of thyme, eucalyptus, mentha and gaultheria, which enter into the composition of Listerine. The quality of excellence of the soap-stock which serves as the vehicle for this medication, will be readily apparent when used upon the most delicate skin, and upon the scalp.

Listerine "Dermatic" Soap contains no animal fats, and none but the very best vegetable oils enter into its composition; in its preparation unusual care is exercised, and as the antiseptic constituents of Listerine are incorporated with the Soap after it has received its surplus of unsaponified emollient oil, they retain their peculiar antiseptic virtues and fragrance.

A Sample of Listerine Dermatic Scap may be had upon application to the Manufacturers—

LAMBERT PHARMACAL CO., St. Louis, U. S. A.

Be assured of genuine Listerine by purchasing an original package

Cattell

First edition exhausted in six months Second revised and enlarged edition

Almost Ready

Post-Mortem Pathology

By HENRY W. CATTELL, A.M., M.D.

Sometime Director of the Josephine M. Ayer Clinical Laboratory of the Pennsylvania Hospital; Pathologist to the Philadelphia Hospital; Senior Coroner's Physician of Philadelphia; Pathologist to the Presbyterian Hospital; Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania.

Octavo. 464 pages. 183 illustrations. Cloth, \$3.00.

R. CATTELL, whose name is already well known to our readers as one of the editors of the English translation of Ziegler's work on General and Special Pathology, has in 'Post-Mortem Pathology' written an excellent guide to the proper carrying out of post-mortem examina-This volume will prove to be a most useful reference book on matters connected with every branch of the subject; where description fails to convey the meaning of some manipulations, excellent illustrations make matters quite There is no doubt that many practitioners feel the want of some such aid, for in the past we fear our own curriculum of medical education has been defective in not insisting upon closer attention to such matters. To English as well as American readers this volume will be of service in this direction, and considerable help will be found in the chapter dealing with difficult questions of medicolegal character. Dr. Cattell's great experience in pathological inquiries gives him the right to produce a work of this kind, and, as might be surmised, there is little room for criticism of the statements made, though the reader may disagree with some of the methods recommended—as, per example, the method of opening the skull-such differences are of minor importance. After discussing the choice of instruments and the design of post-mortem rooms and refrigerator apparatus, the account is given of the various pathological appearances met with in various systems in different diseases. Special guidance will be found for the examination of children, and for what are called restricted post-mortem examinations.

"Harkes's method for securing a view of the nasopharnyx by median section of the skull after the calvarium has been removed is described, and a useful account is given of the methods to be adopted for preserving bodies for subsequent examinations and embalming. Amongst other general information will be found an account of the methods to be adopted to fix permanently the colors of the tissues in museum specimens (Kaiserling), of the early diagnosis of rabies by the method—elaborated by Babes, Van Gehuchten, and Nelis, and of Uhlenhuth's precipitin test for human blood. The volume closes with a useful analysis of the various modes of death which occur in different diseases."—

British Medical Journal, October 15, 1904.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

Almost Ready

Spalteholz and Barker

Atlas of Human Anatomy

By WERNER SPALTEHOLZ

Extraordinary Professor of Anatomy in the University and Custodian of the Anatomical Museum at Leipzig.

EDITED AND TRANSLATED FROM THE THIRD GERMAN EDITION BY LEWELLYS F. BARKER, M.B., Tor.

Professor of Anatomy, University of Chicago.

WITH A PREFACE

By FRANKLIN P. MALL

Professor of Anatomy in the Johns Hopkins University, Baltimore.

Square Octavo. 872 pages. 935 illustrations, mostly in colors. 3 volumes Cloth, \$10.00 per set

OR convenience this atlas is divided into three volumes:

Vol. I.—Bones, Joints, Ligaments.

Vol. II.—REGIONS, MUSCLES, FASCIÆ, HEART, BLOOD-VESSELS.

Vol. III.—Viscera, Brain, Nerves, Sense Organs.

Pictures of dissections, true to nature, aid the imagination, refresh the memory, and act as an excellent guide in the practical work of the physician and surgeon. In this atlas the illustrations are typical, and give all the stages of a dissection of a body from its beginning to its completion.

This work is intended to embrace the entire descriptive anatomy, with the exception of histology, and is likewise to have due regard for the field which lies between microscopic and macroscopic anatomy proper.

The topographic relations of the organs, and especially of the vessels and nerves, have been given the utmost consideration obtainable within the compass of a book which treats primarily of descriptive anatomy. When objects have appeared difficult from a teaching standpoint, many drawings were made from every possible view-point.

The text gives a clear description of the figure, and it is much more detailed than is really necessary in an atlas in which the illustrations are the essential, yet it resembles many text-books in completeness. For showing the soft parts, the material was all earefully hardened in formalin.

Notwithstanding the enormous cost of production, the price has been kept down to a figure that places this sumptuous work within the reach of every practitioner and student. The majority of the illustrations are from original drawings by the well-known anatomical artist, Bruno Héroux.

The book speaks for itself, must be seen to be appreciated, and, when once seen, will be universally lailed as one of the finest anatomical atlases ever placed upon the market.

J. B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Our new Catalogue is well worth having-sent on request

The Diseases of Society

(The Vice and Crime Problem)

BY G. FRANK LYDSTON, M.D.

Illustrated. 8vo. Cloth, \$3.00, net. Postage, 17 cents extra

THE most direct, forceful, and out-spoken study of social conditions in this country which has yet been put into print. Lydston considers not only the police criminal, the anarchist, and the sexual pervert, but also that vast number of offenders against the moral and physical laws whom the courts cannot reach. He deals with the oppression of wealth, the rights and wrongs of organized capital and labor, the negro question and the crimes which have grown out of it, and with the offences of "society" at large. His book is written in the most trenchant and brilliant style. His statements cut to the bone; tells the truth without fear or favor. As a physician, physiologist, and student of social conditions, he has had wide experience for many years.

9

CONTENTS

CHAPTER

I. Social Pathology.

II. The Principles of Evolution in their Relations to Criminal Sociology and Anthropology, and to Social Diseases in General.

III The Etiology of Social Diseases in General, with Especial Reference to Crime.

IV Neuroses in their Relations to Social Diseases—
Brain Development—Insanity—The Criminal Skull—Epilepsy—Hysteria—Suicide.

V The Chemistry of Social Diseases—Toxemia in its Relations to Vice and Crime—Alcoholism, Narcotic Inebriety, and Auto-Intoxication.

VI. Anarchy in its Relations to Crime.

CHAPTER

VII. Sexual Vice and Crime.

VIII. Sexual Vice and Crime (continued) Satyriasis and Nymphomania—Sexual Psychopathy.

IX. The Race Problem in its Relation to Sexual Vice and Crime.

X. The Treatment of Sexual Vice and Crime.

XI. Genius and Degeneracy.

XII. Physical and Psychic Characteristics of the Criminal.

XIII. Illustrative Crania and Physiognomies of Degenerates—Types of Criminals.

XIV The Therapeutics of Social Disease in General, with Especial Reference to Crime.



PUBLISHED BY

J. B. LIPPINCOTT COMPANY, PHILADELPHIA

White and Martin

Genito-Urinary Surgery

and Venereal Diseases

By J. WILLIAM WHITE, M.D.,

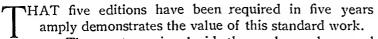
John Rhea Barton Professor of Surgery, University of Pennsylvania.

AND

EDWARD MARTIN, M.D.,

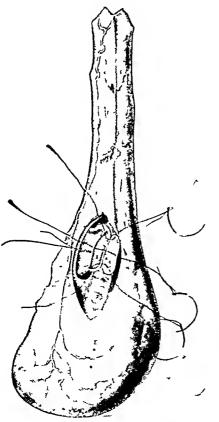
Professor of Clinical Surgery, University of Pennsylvania.

Octavo. 7 colored plates. 245 text illustrations. 1068 pages. Cloth, \$6.00; sheep, \$7.00. Sixth Edition.



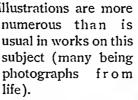
The most concise, lucid, thorough, modern, and practical book on the subject in the English language.

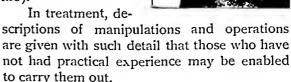
Those portions which deal with symptomatology and diagnosis are unusually full, and the illustrations are more



Anastomosis between the vas deferens and the head of the epididymis.







All the practical points embraced under the general heading of Psychopathia Sexualis are carefully given, while genito-urinary asepsis and antisepsis are so simplified and clearly stated that they are made practicable for every physician.

There is included an exceptionally comprehensive study of the changes in the urine and its constituents produced by disease, a subject so intimately connected with the specialty to which this work is devoted as to deserve much more attention than it usually receives.

Everything is put in such form as to be of practical use to the general practitioner and student, which accounts for the wide sale of the book and its almost universal adoption as a standard college text-book.

Publishers J. B. LIPPINCOTT COMPANY

Philadelphia

Barker

Manual of Human Anatomy

By LEWELLYS F. BARKER, M.B., Tor.

Professor and Head of the Department of Anatomy in the University of Chicago and Rush Medical College

ASSISTED BY

DEAN DEWITT LEWIS, A.B., M.D.

AND

DANIEL GRAISBERRY REVELL, A.B., M.B.

Instructors in Anatomy in the University of Chicago

Octavo. 600 pages. 300 illustrations-many in colors. Cloth, \$5.00

THIS work is designed to be more systematic, more orderly, and to conduce to more thorough work in the dissecting-room than any of the Laboratory Manuals now on the market, all of which are more or less unsatisfactory, partly because so much is included that the student leans entirely upon his manual.

It is believed the use of Barker's Laboratory Manual will enable the good student to become an independent worker much more quickly than when he is left without such guidance. He will be able to do his work in less time and can assure himself that he is doing it thoroughly, using the manual merely as a control of his work, and the student who is well equipped will be gradually led into independent work which he might otherwise never attain.

There should also be a marked saving of time and energy for the instructor, enabling him to make contributions to knowledge by original investigation in his department. It will not, however, make "word of mouth" instruction superfluous. It is hoped that the use of the manual will make it possible for the instructor to concentrate his attention upon and to give better than before that particular help to the student which comes alone through the personal encounter. The sequence of dissection and the methods of exposing the various parts are those almost universally adopted in the better English and American laboratories. There seems to be no doubt that this nomenclature will be the present one for at least many years to come, but, in order that Barker's Manual may be used with the older text-books, the old terms, when different from the new, have been added in parentheses, and both sets of terms are indexed at the back of the book, so that the student may never be embarrassed in using any text-book or atlas in conjunction with Barker.

It is one of the most sumptuously illustrated manuals ever offered. The eolored illustrations are numerous, beautiful, and practical.

J.B. Lippincott Co. Philadelphia . since 1792 London . . . since 1872

Lippincott's Medical Dictionary Revised New Edition

By RYLAND W. GREENE, A.B., JOHN ASHHURST, JR., M.D., Barton Professor of Surgery and Professor of Clinical Surgery in the University of Pennsylvania; GEORGE A. PIERSOL, M.D., Professor of Anatomy in the University of Pennsylvania; JOSEPH P. REMINGTON, Ph.M., F.C.S., Professor of Theory and Practice of Pharmacy in the Philadelphia College of Pharmacy.

Imperial Octavo. 1154 pages. 64 full-page plates. Half leather, \$4.50; with patent thumb index, \$5.00

Post-Mortem Pathology

Second Edition

By Henry W. Cattell. A.M., M.D., Sometime Director of the Josephine M. Ayer Clinical Laboratory of the Pennsylvania Hospital; Pathologist to the Philadelphia Hospital; Senior Coroner's Physician of Philadelphia; Pathologist to the Presbyterian Hospital; Prosector of the American Anthropometric Society, and Demonstrator of Morbid Anatomy in the University of Pennsylvania.

Octavo. 464 pages. 183 illustrations. Cloth, \$3.00

Practice of Surgery

Third Edition

By Henry R. Wharton, M.D., Clinical Professor of Surgery in the Woman's Medical College, Philadelphia; Surgeon to the Presbyterian and Children's Hospitals; Consulting Surgeon to St. Christopher's Hospital and the Bryn Mawr Hospital; Fellow of the American Surgical Association.

And B. Farquhar Curtis, M.D., Professor of Clinical Surgery and Adjunct Professor of the Principles of Surgery in the University and Bellevue Medical College of New York; Surgeon to St. Luke's Hospital and to the Memorial Hospital; Fellow of the American Surgical Association.

Octavo. 1241 pages. 923 text illustrations. 18 colored figures. Cloth, \$6.50; Sheep, \$7.50

Atlas of Human Anatomy

By Werner Spalteholz, Extraordinary Professor of Anatomy in the University and Custodian of the Anatomical

Museum at Leipzig.

Edited and translated from the Third German Edition by L. F. BARKER, Professor of Anatomy, University of Chicago.

With a Preface by FRANKLIN P. MALL, Professor in the Johns Hopkins University at Baltimore.

Octavo. 872 pages. 935 illustrations, mostly in colors. 3 volumes. Cloth, \$10.00 per set

A Treatise on Applied Anatomy

By Edward H. Taylor, M.D., Surgeon to Sir Patrick Dun's Hospital; University Examiner in Anatomy; Late Lecturer in Applied Anatomy, Trinity College, Dublin; Member of Council, and late Examiner in Surgery, Royal College of Surgeons, Ireland.

Octavo. 738 pages. 178 figures and plates, many in colors. Cloth, \$9.00

Manual of Practical Anatomy

Third Edition

By D. J. Cunningham, M.D. (Edin. et Dubl.), D.Sc., LL.D., D.C.L. (Oxon.), F.R.S., Professor of Anatomy and Chirurgery, University of Dublin.

Crown 8vo. 1212 pages. 430 illustrations, 130 in colors. 2 volumes, \$5.00

Publishers—J. B. LIPPINCOTT COMPANY—Philadelphia

Wharton and Curtis

Practice of Surgery

By HENRY R. WHARTON, M.D.,

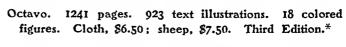
Clinical Professor of Surgery in the Woman's Medical College, Philadelphia, Pa; Surgeon to the Presbyterian and Children's Hospitals; Consulting Surgeon to St. Christopher's Hospital and the Bryn Mawr Hospital; Fellow of the American Surgical Association.

AND

B. FARQUHAR CURTIS, M.D.,

Professor of Clinical Surgery and Adjunct Professor of the Principles of Surgery in the University and
Bellevue Medical College of New York; Surgeon to St. Luke's Hospital and to the Memorial Hospital; Fellow of the American Surgical

Association.



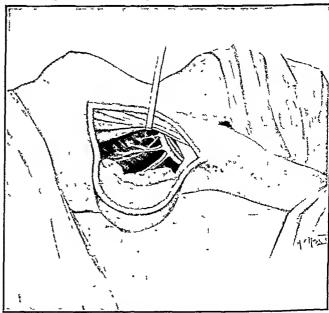
N this work a large amount of space is given to subjects of practical importance, such as fractures, dislocations, wounds, etc., with due attention to small details of treatment which are so important in obtaining good results. Many paragraphs centain more information than pages of other works to which the profession is accustomed. Especially in the lines of diagnosis and treatment,

directions are satisfactory, minute, clear, easy of reference, copiously illustrated with carefully selected cuts, most of them original, adding greatly to the value of the book by explaining the text and furnishing a means of reference for diagnosis. This is especially so of the chapters on Amputation, Bandaging, Fractures and Dislocations,

Tumors, Diseases of the Breast, of the Female Genitals, Mouth and Jaws, and Orthopædic Surgery.

The chapters that have been the most highly praised by the reviewers and that will most strongly appeal to the general practitioner are those on Wounds, Asepsis, Antisepsis, Fractures, Dislocations, the Abdomen, Breast, Head and Spine, Diseases of the Mouth, Tongue, Rectum, and Genito-Urinary Organs.

This is not an ordinary plate revision, but the entire book has been reset, every part being rewritten to bring it abreast of the times.



Removal of the breast: the dissection of the axilla has been completed, and the breast, tumor, and glands are ready for removal in one mass.

Publishers :: J. B. LIPPINCOTT COMPANY :: Philadelphia
When writing, please mention Annals of Surgery.

Two Popular Novels

BACCARAT

FRANK DANBY'S NEW BOOK

Author of "Pigs in Clover"

Six Illustrations in Color

A wife, left by her husband at a French watering place, is drawn, before she is aware, into the feverish life of a Monte Carlo. Her struggles to free herself before her name and fortune are gone, are piteous, and the scenes are surcharged with passion and pathos.

It is a book of startling realism, and painted in strong colors, but the story is told charitably and without offense by one who has a profound knowledge of human nature and depicts life faithfully as she finds it.

Cloth, \$1.50

Chronicles of Don Q.

By K. and H. PRICHARD

Illustrated

One of the best and most stirring stories of romantic adventure written in many a day.

"Don Q." is a suave and crafty bandit, as elusive as he is fearless, and the claws under the velvet tear with merciless fury. The book is full of action, and absorbing from first to last; the kind which appeals to all who enjoy a strong story of strategy and daring.

Cloth, \$1.50

SEND FOR LIST OF NEW FICTION

J. B. LIPPINCOTT COMPANY

Publishers — Philadelphia

Colorado's Climate

affords every delight to the seeker of health; abundance of sunshine and invigorating dry air; a climate approaching perfection, where the sky is clear and blue, and fog and dampness unknown; where the winters are mid and the summer heat never oppressive.

¶Its numerous delightful health and pleasure resorts are reached by the elegant trains of

THE COLORADO & SOUTHERN RAILWAY

The following publications sent on receipt of postage:

Picturesque Colorado . 3c. Colorado's Climate . . 2c. Resorts in Platte Canon 2c.

T. E. FISHER,

General Passenger Agent, Denver, Colo.

WINTER-RESORTS OF THE SOUTH REACHED BY THE SOUTHERN RAILWAY

The Southern Railway announces the sale of round-trip Winter excursion tickets, with stop-over privileges, to all the principal resorts of the South, beginning October 15, 1904.

The winter-resorts of North and South Carolina, Georgia, and Florida are especially inviting to those in search of health or pleasure. In these States are such noted resorts as Pinehurst and Asheville, N. C.; Camden, Aiken, Summerville, and Charleston, S. C.; Augusta, Savannah, Brunswick, Jekyl Island, and Thomasville, Ga.; Jacksonville, St. Augustine, Ormond, Daytona, Palm Beach, Rockledge, Miami, and Tampa, Fla.: also the resorts of Porto Rico and Cuba are best reached via Southern Railway.

Tickets on sale up to and including April 30, 1905, limited to return until May 31, 1905.

Winter tourist tickets are also on sale to the noted resorts of the Gulf Coast, Mobile, New Orleans, Texas, Mexico, New Mexico, Arizona, and California.

The Southern Railway now has greatly improved facilities, having completed considerable portion of its double track road, and the completion of the new double track bridge over the Potomac River at Washington also expedites the movements of its trains.

Elegant vestibuled trains with the latest Pullman drawing-room sleeping cars are operated through between eastern cities and the southern resorts. The very best dining car service, and everything for the comfort and pleasure of its patrons.

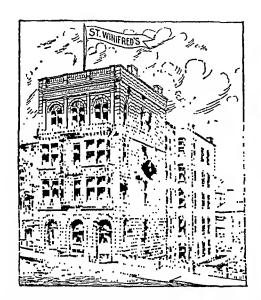
The route of the "Washington and Southwestern Limited," "Palm Limited," and the "Sunset Limited."

Charles L. Hopkins, District Passenger Agent, Southern Ry., 828 Chestnut Street, Philadelphia, Pa, will take pleasure in furnishing all information.

GRAND PRIZE GOES TO WM. R. WARNER & CO.

The many friends and customers of Wm. R. Warner & Co. will be pleased to learn that such a progressive and reliable firm has been honored by the highest award, over all competitors, at the Louisiana Purchase Exposition (St. Louis) for pharmaceutical preparations.

This firm already has fifteen World's Fair Medals to their credit.



St. Winifred's Hospital, 1025 Sutter Street,

SAN FRANCISCO, CALIFORNIA.

A New FIRE-PROOF Hospital

with Fifty Sunny Rooms. Centrally located. The most Modern Operating Rooms in the West. A Private Sanatorium for Medical and Surgical Cases.

WINSLOW ANDERSON, M.D., M.R.C.P. Lond., etc., Medical Director.

Marvellous Cures

have been effected by the use of the pure, clear, palatable, cold waters of

Eureka Springs, Arkansas.

Diseases of the stomach, liver, kidneys, and nerves; rheumatism; asthma; malaria; yield readily to their use.

Excellent hotels at moderate Delightful mountain scenery. Pine-laden, clear, dry air and plenty of sunshine.

One Night From St. Louis.

Write for " The Summit of The Ozarks,"



PERRY GRIFFIN, 111 South 9th St., PHILADELPHIA, PA.

HAL. S. RAY, G. E. P. A., 401 Broadway, New York

17 UNION SQUARE, NEW YORK.

Dear Doctor: -

an abdominal belt has to be shaped right in order to fit and give real support. We have had many years of practical experience in the actual fitting of supporters to individual patients and we know how a belt should be Made to Fit.

One treal will convince you. Respectfully yours, Pomeroy Company

SUPPORTING BELTS

"Made to Fit."

SPECIAL ELASTIC

SELF ADJUSTING



Price, thread, \$2.06 (net) Price, silk, \$2.62 (net)

Price, (net) \$2.25

Pomeroy Company

New York

17 Union Square

New York

Quality Enclose Price \$ |

Catalogues on Supporting Belts, Elastic Stockings, Trusses. Orthopedics. request.

DIRECT-IONS FOR MEASURING.

ences on corresponding lines in the cut.

Place circumfers

Bureau of Health Chemists Endorses Bailey's Pure Whiskey



To the testimony of some of the best known physicians of Philadelphia, and that of nurses whose professional duties demand that they occasionally use a pure whiskey, comes the following remarkable endorsement from Doctor William C. Robinson, chemist of the Philadelphia Bureau of Health:

I have tested five quarts of whiskey labelled "Bailey's Rye Whiskey," taken in sealed bottles by me from the stock exposed for sale at your store, 1209 Market Street, by six different methods, including three well known ones (the Miller, the Resorcinol, and the Phloroglucin). In all the samples, and by all the methods, the results were negative. In other words, I found these whiskies to be free from adulteration and all foreign and injurious admixtures.

The same chemist analyzed our wines, and found them free from all

adulterations or preservatives.

An analysis of the whiskey was also made some years ago by the Franklin Institute, when its absolute purity was pronounced.

SPECIAL OFFER TO PHYSICIANS AND NURSES.

In order to give professional practitioners the opportunity of observing the excellent quality of Bailey's Pure Rye for themselves, we will send to any address one gallon of the \$1.50 per quart whiskey (the famous Yellow Label) for \$4.00—a discount of 33½ per cent. On all orders after that we will allow a 10 per cent. discount. This is open only to physiciaus and nurses, for home or professional use.

Write for copies of analysis, etc.

HUEY & CHRIST

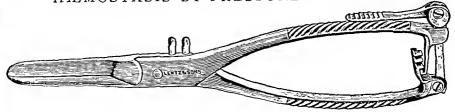
1209 Market Street

PHILADELPHIA

Surgery Without Ligatures

DOWNES' ELECTRO-THERMIC ANGIOTRIBE

HÆMOSTASIS BY PRESSURE AND HEAT



Four Styles of Forceps, three straight blades, ¼, ¾, and ½ inch wide, and curved blade ¾ inch wide.

Over 600 major abdominal operations performed without secondary hemorrhage.

Forty leading American surgeons are now using them. Write for reprints and circulars.

CHARLES LENTZ & SONS

Manufacturers of Surgical Instruments

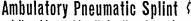
18 and 20 North Eleventh St.

Philadelphia

FRACTURES

HIP-THIGH-LÉG

Easily set and treated, without shortening or deformity, with the



Adjustable to either limb, all patients, for treatment in bed or walking. SEND FOR EOOKLET, ETC. Sold direct or through your supply house.

Ambulatory Pneumatic Splint Mfg. Co. 169 E. Randolph Street. Chicago.



BETA-EUCAIN AND EUCAIN-ADRENALIN.

Dr. Otto Simon, first assistant in Prof. Czerny's Surgical Clinic at Heidelberg, calls renewed attention to the severe intoxication which even minute quantities of cocain may produce in predisposed individuals. In a neurasthenic, aged twenty-four, death set in two minutes after injection into the urethra of 13 drams of a 1 per cent. cocain solution. Since then Simon uses exclusively It has entirely the same Beta-Eucain. effect as cocain when administered in 0.6 to 0.9 per cent. saline solution at the body temperature; and in one hundred and eighty-eight anesthesias a little headache and nausea was only encountered once, when the bladder was filled with 23 ounces of a 4 per cent. solution, which vanished immediately when the bladder was washed out.

Eucain-Adrenalin is especially useful in the extirpation of subcutaneous or deep-seated tumors, lipomata, mammary adenomata and strumous lymphatic glands, for excision of tumors, cancers, and angiomata, and for minor operations around the head and face. For the extirpation of tubercular glands and for Winkelmann's hydrocele operation, it may be used alone or with Adrenalin. In chronic tubercular osteitis, gauglion, for the removal of foreign bodies, for tendon suture, and in operating on ingrown toe-nails, Eucain should be used alone; and he also employed it for cystoscopies and litholapaxies.

For infiltration anesthesia he advises a warm 0.5 per cent. to 1 per cent. Eucain solution with 0.6 per cent. to 0.9 per cent. sodium chloride and 1:20,000 to 1:30,000 Adrenalin. Adrenalin strengthens the Eucain anesthesia and has no undesirable effect in these dilutions.

Where applicable, Oberst's method, with 1 per cent. Beta-Eucain, is preferable to simple Eucain infiltration and even to Eucain-Adrenalin.—Abstracted from the Münchener Med. Wochenschrift, Vol. 51, No. 29, July 19, 1904,

Virginia Hot Springs

2500 FEET ELEVATION OPEN ALL THE YEAR

Waters, baths, hotels and scenery nowhere equalled

Rheumatism, gout, obesity and nervous diseases eured. New hydrotherapeutic apparatus installed. Golf, swimming pool, fine livery and outdoor pastimes. THE NEW HOMESTEAD is modern in the strictest sense, and patronized by the highest class. Brokers' office with direct N. Y. wire.

The Chesapeake & Ohio Railway,

World's Fair Scenic Route

allows stop-over at Covington, Va., on through tickets to Cincinnati, Louisville, Chicago, St. Louis, and the West, for side trip to Virginia Hot Springs.

Pullman compartment car, via Washington, leaves N. Y. 4.55 p.m., arrives Springs 8.25 a.m., eastern time. Excursion tickets at C. & O. offices, 362 Broadway, offices of Penna. R. R. and connecting lines generally.

FRED STERRY, Manager, Hot Springs, Va.



FREE

Catalogue F.

THE 20TH CENTURY POLYCLINIC TABLE

Manufactured by
THE PERFECTION CHAIR COIndianapolis, Ind.



The WALKEASY

ARTIFICIAL LEG

Our Art Catalog contains valuable information on Care and Treatment of Stump Preparatory to applying an Art Limb. How Soon to Apply. Art Limbs for Children. Directions for Self-Measurement, etc., etc.

GEORGE R. FULLER CO., ROCHESTER, N.Y. Branches, Chicago, Buffalo, Boston, Philadelphia

SAL HEPATICA.

Effervescent uric acid solvent and eliminator, stimulates liver, tones all intestinal glands, purifies alimentary tract and improves digestion, assimilation and metabolism. It is practically specific in rheumatism. gout and bilious attacks. Sal Hepatica has no equal for climinating toxic products from intestinal tract or blood, and correcting vicious or clogged functions. Write for free sample.

BRISTOL-MYERS CO.. Brooklyn, New York





A LAND of astounding contrasts in both scenery and inhabitants. Where, within a day's journey of each other, are the sombre grandeur of Noiwegian fjords and peaceful beauty of the Irish lakes. Volcanoes in eruption, glaciers and geysers Mountain scenery unsurpassed by Switzerland. The land of the Maoris where civilization and savagery touch elbows as nowhere else on earth. The one corner of creation which should not be left unvisited.

Oceamic Steamship

American and Australian Line

Offers a luxurious passenger service between San Francisco, Hawan, Samoa, 'I ahm, New Zealand and Australia Around the World. Send 15 cents postage for handsome New Zealand book. Illustrated folder free.

J. D. SPRECKELS @ BROTHERS CO., General Agents,

643 Market Street, San Francisco

E. F. BURNETT, General Eastern Agent,

429 Broadway, N. Y.



A new 'promised land,"

SALT LAKE IN WINTER.

In the valley of the Jordan which traverses a new promised land, sits the gem of Utah—Salt Lake City. The climate is delightful, the city is of unusual interest, and a visit is always enjoyable. It can best be reached by the

NEW YORK CENTRAL LINES,

and their connections.

A copy of No 5 of the "Four-Track Series," "America's Winter Resorts," will be sent free, to my address, on receipt of a two cent stamp, by George H Daniels, General Passenger Agent, New York Central & Hudson River Railroad, Grand Central Station New York

APPLICATION

AN

RESUMPTION OF SUNSET LIMITED SERVICE BETWEEN NEW YORK. PHILADELPHIA, AND PACIFIC COAST.

ADDITIONAL AND IMPROVED SERVICE TO FLOR-IDA, SEASON 1904-1905, VIA SOUTHERN RAILWAY.

Commencing November 6th, the Washington and Southwestern Limited, composed of Pullman drawing-room, sleeping, observation-library, club, and dining cars, operated daily between New York, Philadelphia, and New Orleans, via the Pennsylvania Railroad and the Southern Railway, leaving Philadelphia at 6.50 p.m., in addition will carry a special Sunset Limited Annex Pullman drawing-room sleeping car to connect with the Sunset Limited, which will be operated daily this season between New Orleans, Los Angeles, and San Francisco. The celebrated trans-continental service afforded by these luxurious trains makes a trip to the Pacific Coast not only very quick, but most delightful.

Also on November 6th, the New York and Florida Express will be established, giving additional and improved train service to Florida. This train will leave Philadelphia. Penna. Railroad, at 5.55 P.M., daily; leave Washington, D. C., Southern Railway, at 9.50 P.M., and will carry through Pullman drawing-room sleeping cars to Columbia, Augusta, Savannah, Jacksonville, and other points.

Charles L. Hopkins, District Passenger Agent, Southern Railway, 828 Chestnut Street, Philadelphia, Pa., will take pleasure in furnishing all information.

THE AMBULATORY PNEUMATIC SPLINT.

Is ideally adapted to the treatment of fractures of the hip, thigh, leg, patella, cases of non-union, knee and hip-joint disease. Owing to the superior facilities that it affords the surgeon, shortening or deformity are avoided. This appliance has been greatly improved, adding to its durability and effi ciency and is recommended and used by many prominent surgeons as being the best most satisfactory, and comfortable method or treatment of patients in the recumbent or ambulatory position.

A BRACER

that does not brace too much is often indicated in every doctor's practice.

Goldbeck's Malt Extract

is a tonic without reaction,—an appetizer that creates a genuine relish for proper food not be supplanted. Can be relied upon in

and once prescribed will cases where a mild and effective tonic is necessary. Especially useful to Nursing Mothers.

JOHN F. BETZ & SON, Limited, Crown and Callowhill Streets, Philadelphia, Pa.



Largest Suspender and Leather Belt Makers in the World. Box 5, 87 Lincoln Street, Boston, Wass.



The

Gold Meda

has been awarded to the

LOFTIS SYSTEM

by the Judges at the Saint Louis Exposition. This is the highest endorsement possible, and puts the official stamp of the greatest exposition ever held upon our goods, prices, terms and puil:ods, against all competition, foreign and don: wic.

What is the Loftis System? Which permits the far-away buyers to select the fluest Diamonds, Watches and Jewelry from our beautifully illustrated catalogue and have them sent to their home, place of business or express office on approval. You need not pay one penny for express charges or otherwise—we pay everything—leaving you free to decide whether to buy or not after the fullest examination of the article sent

Credit Terms. If what we send non-difficity on delive to us direct, in eight equal monthly payments.

permit us to open confidential charge accountendollara week employe is just as welcome as a customer on our books as is his wealthy 6 : 10 cm.

Cash Terms. We also have a casu easy payment terms.
-iten agreement that y teles ten per cent. Y bring or send it bac a whole year, less than ten cents per week.

Guarantee and Exchange. With every Diamond we give a warrend also accept any Diamond ever sold by us as so much money in exchange for a larger Diamond every transaction with our house will be satisfactory—our record is a guarantee of the largest house in the business, and winner of the World's last the carried to the largest house in the business, and winner of the World's last the carried to the largest house in the business.

Christmas Selections. Don't wait to make Christmas selections in the confidence of t

Christmas Catalogue. Our handsomely illustrated Christmas Cambogue is today, and do not make a single selection until you have received it. It is illustrated to the best possible guide you can have to reliable goods, satisfactory our large terms of payment. Notwithstanding the fact that we have the greatest cape it is it long facilities in the world for handling business expeditiously and satisfactorily, we strongly any interesting advisability of ordering your selection early. Our Christmas business is community enormality instakes are vexatious; delays are dangerous. Write today.

Souvenir. You will receive in addition to our Christmas Catalo, me a copy of our which have been distributed at our Diamond Cutting Exhibit in the Various it constituted at the Universal Exposition, St. Louis. Write at once to insure receiving a copy.

.CO ىن LOFTIS BROS

Diamond Cutters and Manufacturing Jewelers

Dept. P. 274. 92 to 98 State St., Chicago, Ill.

Copyright, 1904, Franklin Advertising Agency, Chicago.

TAMOND A.WOINDS WIN **IEARTS**

ovilla od 14. Characterist Particidados On the vector

EVERY PHYSICIAN KNOWS.

In the North American Practitioner, under the head of "Intestinal Antisepsis," reported by Dr. Pettingill of New York City, we find some excellent experiences, and from which the following is selected:

"Every physician knows full well the advantages to be derived from the use of antikamnia in very many diseases, but a number of them are still lacking a knowledge of the fact that antikamnia in combination with various remedies, has a peculiarly happy effect; particularly is this the case when combined with salol. Salol is a most valuable remedy in many affectious; and its usefulness seems to be enhanced by combining it with antikamnia. The rheumatoid conditions so often seen in various manifestations are wonderfully relieved by the use of this combination. After fevers, inflammations, etc., there frequently remain various painful and annoying conditions which may continue, namely: the severe headaches which occur after meningitis, a 'stitch in the side' following pleurisy, the precordial pain of pericarditis and the painful stiffness of the joints which remain after a rheumatic attack-all these conditions are relieved by this combination called 'Antikamnia and Salol Tablets,' containing 21 grains each of antikamnia and of salol, and the dose of which is one or two every two or three hours. They are also recommended highly in the treatment of both acute and chronic cystitis. The pain and burning is relieved to a marked degree. Salol makes the uric acid and clears it up. This remedy is a reliable one in the treatment of diarrhea, entero colitis, dysentery, etc. dysentery, where there are bloody, slimy discharges, with tormina and tenesmus, a good dose of sulphate of magnesia, followed by two antikamuia and salol tablets every three hours, will give results that are gratifying."

GOLDBECK'S MALT EXTRACT

In cases of simple depression or of tardy convalescence, where there is need of an appetizer and digester, try Goldbeck's Malt Extract. One thing is certain,—the patient's co-operation is assured. It suits the most fastidious. This preparation if once known is never forgotten. It is not only efficacious but exceedingly agreeable to the taste. Try it. Especially useful to the nursing mother.

Sent Under a Guarantee

The HYGIENIC PERFECTION MATTRESS



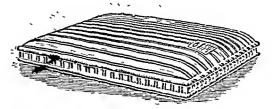
Delivered anywhere in the United States

75,000 in use and every one giving entire satisfaction.

Made in one continuous bat. Will never become lumpy or packed. Is dust and vermin proof and is renovated by sunning.

OUR GUARANTEE.

Sleep on it sixty nights, and if you are not thoroughly satisfied—if it is not superior to any \$50.00 hair mattress in cleanliness, comfort and durability, return it and get your money.



THE HYGIENIC PERFECTION MATTRESS.

It Cannot Fail to Give Entire Satisfaction.

PERFECTION MATTRLSS Co.,

Perfection Mattrelss co.,
Birmingham, Ala.
Gentlemen:—After a thorough test of the Hygienic Patent Perfection Mattress, I do not hesitate to pronounce it the best mattress I have ever used. Its elasticity and general comfort I have never seen equalled in any mattress. It cannot fail to give entire estimate of the control of the contro tire satisfaction.

Yours truly,

A B. CURRY

Pastor Second Presbyterian Church, Memphis, Tenn.

WRITE TODAY FOR FREE LITERATURE.

Appress

PERFECTION MATTRESS CO.

227 21st Street N. Birmingham, Ala.

DECEMBER LIPPINCOTT'S MAGAZINE,

STRIKINGLY appropriate to the election season is the novelette in the Christmas number of Lippincott's Magazine. Its author is Alden March, one of the Editors of the Philadelphia Press, and its title is "A Darling Traitor." In it there is a deft commingling of love and politics and a deep sub-stratum of real humor. The scene at dinner between a priest and a crooked politician is intensely dramatic, while the character work—from freckled-faced, devil-may-care Joe, the office boy, to the irresistible Edith North—is undeniably strong. It is predicted that "A Darling Traitor" will appear on the stage before long.

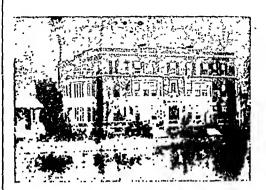
General Charles King leads the shorter fiction with one of his inimitable Indian war stories. This is called "The Boy that Couldn't Stand Fire," and it begets the thrill which goes with a tale of valor that rings true. A charming Christmas story by Phœbe Lyde is "The Abbot of Bon-Accord." Its fanciful theme and delicate treatment adapt themselves to the holidays. Baroness von Hutten contributes one of her delightful "According to Lady Moyle" stories. This time it is "About Mademoiselle Ziska," a snake-charmer, who falls victim to the fascinations of Lady Moyle's butler and almost causes his downfall. "A Crustacean Courtship," by Mabel Nelson Thurston, is a clever tale of country life in which love and lobsters take part. Arthur Hendrick Vandenberg has a special gift for the writing of entertaining "Trust" fiction. In "Barlow and the Octobus" he tells how a young fellow, lacking business experience but possessing considerable acumen, comes out ahead in a deal "Billets with the "Gas-Meter Combine." Doux," another Christmas story, is by Thomas Cobb. In this some love-letters-in-wrong-hands are involved and make a breezy tale. It is the time of year when a "bargain" seems specially appealing." So it does to the girl in Clinton Dangerfield's story entitled "The Shears of Destiny." In this case a rich husband is part σ^{f} her bargain.

A momentous paper on "The Regular and the Savage" is written by a Lieutenant L. B., United States Army, in the Philippines. This is so radical as to be likely to provoke both confirmation and denial.

Much of the verse breathes the Christmas spirit, notably that by Thomas Walsh called "The Noel of the Kings," and "The Northman's Christmas Tale," by Chester Firkins. In addition to these there are poems by Maurice Francis Egan, Lizette Woodworth Reese, Agnes Lee, Paul Laurence Dunbar, Elsa Barker, Edward Doyle and Clarence Urmy.

The "Walnuts and Wine" are of rare vintage in honor of this general season of good cheer.

.



SARAH LEIGH HOSPITAL NORFOLK, VA.

A new, thoroughly up-to-date private hospital. Rooms single or *en suite*. Private Baths. Quiet surroundings. Salubrious Climate. Especially for Surgical, Gynecological and Rest Cure Cases. A few Medical cases taken.

Correspondence with physicians invited. Address one of the following:

DR. SOUTHGATE LEIGH, SURGEON IN CHARGE DR. STANLEY H. GRAVES, ASSOCIATE, MISS M. A. NEWTON, SUPERINTENDENT.

THE LOCAL TREATMENT OF ERY-SIPELAS WITH ACETOZONE.

DEAR DOCTOR:

I had an ugly case of facial erysipelas in a woman of about thirty-eight years. I used as a local application, to begin with, a saturated solution of boric acid, and depended largely upon tincture ferric chloride as an internal remedy. I got the attack under control and supposed I would have no further trouble, but all at once the disease began to spread over the scalp. The usual remedies did no good. I thought that if Acetozone was the germ destroyer it was represented to be, it should be of use to me. So I made a solution of fifteen grains to two pints of water and used it freely on the scalp. I obtained results at once, and in twenty-four hours the disease had abated.

J. Knowles, M.D., Logan, Iowa.

140 Cures: No Deaths STEARNS' ANTITOXIN DID IT

UR diphtheritic antitoxin must be better than that of other makers—must have been so from the first—else it would never have become so popular in its five years' use.

True, we have always had the advantage of having the best package—for three years had the only syringe package and still have admittedly the best one—but that alone would never have introduced a serum of ordinary quality.

We started out to make the best antitoxin ever made in this country or any other; we have spent \$100,000 on a plant for that purpose; we have employed the most scientific methods, and our product is one we are proud of.

So when such a physician as Dr. W. F. Mills, of South Bend, Ind., tells us that he has used Stearns' Antitoxin in 140 cases of diphtheria without a single death, we are gratified but not surprised; we expect just such reports.

Dr. A. W. Shea, too (Nashua, N. H.), writes us that our serum has always given him better results than that of other houses, and as for our "Simplex" syringe it is the best thing on the market; and, this being one of thousands of similar expressions, we know that our serum is what we intend it to be—the very best.

Best serum—best syringe—best results.

Writing "Must be Stearns'" on your order brings the right kind.

FREDERICK STEARNS & CO., Detroit, Mich., U. S. A.

Windsor, Ont. London, Eng. New York City



UTRIMENT THAT NOURISHES



Perhaps your patient's digestion is so impaired that food passes through inert. Hence extreme emaciation and loss of vital force.

Prescribe Hydroleine. The starved lacteals will absorb it with eagerness. The patient will show better appetite and better digestion. Color will supersede paleness. Loss of weight will come to a standstill, then turn to gradual gain and general improvement.

Hydroleine succeeds where plain cod-liver oil and ordinary emulsions fail. Being right in principle, it does the work others cannot do.

Literature sent on application. Sold by druggists generally.

THE CHARLES N. CRITTENTON CO.

Sole Agents for the United States,

115-117 FULTON STREET, NEW YORK.

THE CHRISTMAS DELINEATOR.

The December *Delineator*, with its message of good cheer and helpfulness, will be welcomed in every home. The fashion pages are unusually attractive, illustrating and describing the very latest modes in a way to make their construction during the busy festive season a pleasure instead of a task, and the literary and pictorial features are of rare excellence. A selection of Love Songs from the Wagner Operas, rendered into English by Richard de Gallienne and beautifully illustrated in select by L.C. Loventifully, illustrated in select by L.C. Loventifully illustr English by Richard de Gallienne and beau-tifully illustrated in colors by J. C. Leyen-decker, occupies a prominent place, and a chapter in the Composers' Series, relating the Romance of Wagner and Cosima, is an interesting supplement to the lyrics. A very clever paper entitled "The Court Circles of the Republic," describing some unique phases of Washington social life, is from an unnamed contributor, who is said to write phases of Washington social life, is from an unnamed contributor, who is said to write from the inner circles of society. There are short stories from the pens of F. Hopkinson Smith, Robert Grant, Alice Brown, Mary Stewart Cutting, and Elmore Elliott Peake, and such interesting writers as Julia Magruder, L. Frank Baum, and Grace MacGowan Cooke hold the attention of the children. Many Christmas suggestions are given in needlework and the Cookery pages are redolent of the Christmas feast. In addition, there are the regular departments of the magazine, with many special articles on topics relating to woman's interests within and without the home.

36 When writing, please m

CHANGED HIS MIND.

A TRAMP, dirty and ragged to the last degree, called at a house on the door of which was a doctor's sign. A large, rather masculine-looking woman opened the door.

"Scuse me, lady,," said the tramp, "but I jist called to ask if the Doctor had any old clothes he'd let me have. You see, I'm kind o' bad off fer all kind o' clothes, an' I'd be much obleedged fer anything the Doctor could let me have, an' I ain't pertickler as to the fit."

The woman smiled and made reply,—

"I am the Doctor!"

"I am the Doctor!"

"Sufferin' Moses!" ejaculated the tramp as he made a beeline for the gate.—December Lippincott's.

Civic parables are what Clinton Dangerfield endeavors to produce in her more or less powerful way. She sees somewhat profoundly and reports her views in first-rate fiction. "The Shears of Destiny" (Lippincott's Christmas number) is a striking tale with a wedding at the end the end.

THE fiction of business has not yet fully ripened. But on the way up is "Barlow and the Octopus," by Arthur H. Vandenberg. It appears in Lippincott's Magazine's Christmas number and will arrest men of affairs by its cleverness.

FIRST-HAND reports on the conditions in the Philippines are rare because so few observers know how to write vividly. In Lippincorr's Magazing for December there is a significant and picturesque paper by a United States Army Lieutenant which tells in some powerful sentences the whole story of "The Regular and the Savage"—and a remarkable story it is.

86

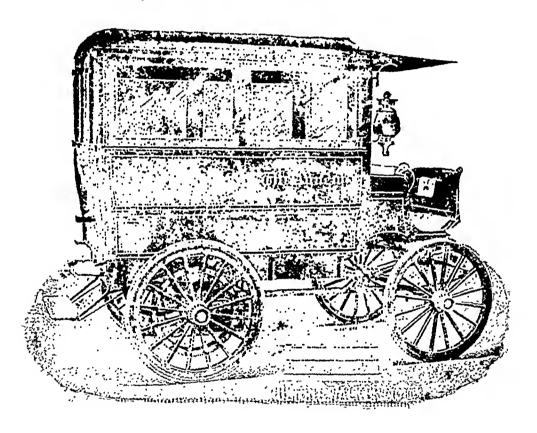
When writing, please mention Annals of Surgery.

The cheapest is not always the Best, but the Best is always the cheapest

THE "NEW AGNEW"

Coach=Ambulance

This Sanitarium Vehicle is unexcelled for Convenience, Comfort, and Durability. A Perfect Coach. A Perfect Ambulance.



Contains best of all modern equipments. This is made either as a horse drawn vehicle or an Electric Automobile. Our price is reasonable. Ask for it.

FULTON & WALKER COMPANY,

20th and Filbert Sts., PHILADELPHIA.

We wish to call your attention to our exhibition of ambulances now at St. Louis, located in the Transportation Building.

REDUCED TO THREE DOLLARS A YEAR.

JOURNAL OF THE Association of Military Surgeons of the United States.

The only Journal devoted to the Military Aspects of Medicine, Surgery and Hygiene in the United States.

Announcement.

Original Articles.

The Journal will, in each number, continue the publication of original papers of the high order which has hitherto characterized the work of the Association. Arrangements have been made for important memoirs relative to the medico-military conduct of campaigns in all lands and by all nations.

Reprints and Translations.

The medico-military ilterature of other countries will be freely laid under contribution, and all important articles in contemporary literature will be drawn upon.

Medico-Military Index.

Ail articles in current literature pertaining to military medicine, surgery and hygiene, not republished will be promptly reported.

Editorial Department.

An accomplished corps of collaborators will cooperate with the editor in presenting timely discussions, reviews, comments, and general information relative to current events of medico-military interest.

Typography and Illustration.

The Journal will continue to be printed in the best style upon heavy supercalendared paper and fine illustrations will continue to be freely employed whenever possible to elucidate the text by their use.

Subscription, Three Dollars a Year in Advance.

Free to members of the Association of Military Surgeons of the United States

Association of Military Surgeons,

Carlisle

Pennsylvania.

REDUCED TO THREE DOLLARS A YEAR.

FOR OUTDOOR WEAR

Regal Shoes come straight from the Tannery to you with but one handling. This Regal short cut saves you four distinct profits, bringing you the highest grade of shoe service in the world for the lowest possible price. Here is a practical illustration of the wonderful shoe values Regal customers receive. Under the Regal system we are

able to sell this fine high topped boot, The "ALP," at the regular Regal price, \$3.50. Try to buy it outside of a Regal store and you will pay from \$7.00 to \$14.00 for a shoe in no way superior to it either in material or workmanship. The leather is heavy oil grain, soft as velvet, tough as iron. It comes in black or tan. The shoe is Blucher cut, lace style, with straps and buckles, 11inch high top, kid lined in vamp, unlined in top, bellows tongue, and extra extension sole. Made as care-fully and as gracefully as a dress shoe, but strong enough withstand the roughest wear. The leather is

All Regal Shoes All Kegal Shoes except the Alp are delivered, carriage prepaid, anywhere in the U nited States or Canada, Mexico, Cuba, Porto Rico, Hawaiian and Philippine Islands, also Germany ands, also Germany and all points covered by the Parcels Post System on receipt of \$3.75 per pair. ("Alp" \$4 00 on account of weight.) The extra charge is for delivery.

> Samples of leather sent on request.

soaked and water-proof.
With a pair of "Alps" you can laugh at the rainiest, slushiest day the winter sends.

Hunters, mountain tourists, prospectors, suburban: ites, college men—anyone who has to do rough walking will find in the "Alp" just the shoe he needs.

ORDER | 76 KA in Black Oil Grain Leather as illustrated BY STYLE | 76 KB same except in Russet

Sent, with charges collect, on receipt of \$3.50. Prepaid for \$4.07 (extra amount is for expressage).

If you want this shoe, order today, as we will not advertise the "Alp" again in this magazine. If not near one of the 80 Regal Stores, send to our Boston or New York Mail-Order Department for measurement blank which will show you how to get the "Alp" by mail in your exact size. by mail in your exact size.

A postal brings you our

NEW STYLE BOOK

It gives you clear instructions how to order. It is like buying in one of our New York stores, for the book contains full descriptions and large photographic reproductions of all our 75 EXQUISITE WINTER STYLES for men and women. Remember these all come in quarter sizes, 288 fittings in each style, making perfect fit a certainty.



Mail Order Departments 636 Summer St., Boston, Mass.

Sub-Station A.—Cor. Geary and Stockton Streets, San Francisco. Snb-Station B.—103 Dearborn St. Chicago. Snb-Station C.—618 Olive St. St. Louis. Sub-Station D.—621 Canal St., New Orleans. Snb-Station E.—6 Whitehall St., Viaduct, Atlanta.

London Post Depot, 97 Cheapside, England.
Regal Shoes are delivered through the London Post Department to any part of the United Kingdom on receipt of 15/6.

The Largest Retail Shoe Business in the World.

MEN AND WOMEN

80 Regal Stores in the Principal 1 Cities.

THE ANNALS OF SURGERY

IS PRINTED
WITH INK MANUFACTURED
BY THE

W. D. Wilson Printing Ink Company (Ltd.)

OF

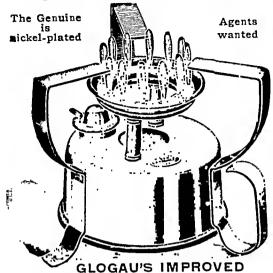
17 SPRUCE STREET

NEW YORK, N. Y.

HARRY TURNER, Philadelphia Representative
2253 NORTH SIXTEENTH STREET

THE VERY THING, DOCTOR,

You have been looking for ever since Sterilizers have been in use.



COHOL GAS STOVE

Ideal for the Sterilizer, the Sickroom, or anywhere where gas is not available or desirable. Makes it own gas, uses only two cents' worth of alcohol in an hour. Burns odorless, wickless, small, compact, weighs only seven and one-half ounces. Will support a vessel weighing on hundred pounds. Cannot explode even if upset, and will not spill. Never gets out of order. Sent anywhere throughout the United States and Canada, express prepaid. on receipt H. GLOGAU, 853 Broadway, Rooms 17 of \$1,00. H. GLOGAU, and 18 New York CitPOND'S EXTRACT.

Recent editorials and reports in the medical press on death and blindness following the ingestion of wood alcohol in Jamaica ginger, witch hazel and other medicinal extracts make it a matter of paramount importance that, in prescribing

EXTRACT OF HAMAMELIS, physicians assure themselves that the extract dispensed does not contain wood alcohol, which imports so grave a menace to the health and life of the patient.
This result may be absolutely preasured

if physicians will invariably

SPECIFY POND'S EXTRACT IN ALL PRESCRIPTIONS.

and thus provide against the substitution and peril of those common, commercial; unidentified and toxically adulterated "witch hazels" of the market frequently misrepresented to be "the same thing" and "just as good," but which have no standard of purity and strength. The descriptive name of

POND'S EXTRACT is synonymous with purity, uniformity, reliability and responsibility.

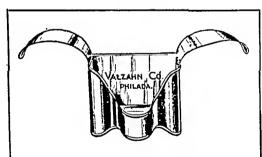
It is the trade mark guarantee upon which its manufacturers stake their reputation. If, therefore, peril to the patient is to be avoided and the desired relief

assured, prescriptions should invariably specify PONDY EXTRACT

GENITO-URINARY IRRIGATION BASIN

ענינו ביוור

DESIGNED BY DR. J. B. CARNETT.



Price, \$7.00 each

THE VALZAHN CO.

PHILADELPHIA SURGICAL INSTRUMENT HOUSE

132 South Eleventh Street PHILADELPHIA, PA.

FOR MALE PATIENTS

This basin is constructed of nickel-plated copper and readily contains two quarts of solution.

Its shape is shown by the illustration.

It is so constructed as to rest comfortably between the patient's legs and is self-supporting, by means of two wide flanges, which rest across the front of the thighs.

It is designed especially for office work of the physician and for those cases in which the patient himself carries out a prolonged course of irrigation.





is indelibly stamped upon the minds of thousands of Surgeons, as being the best and safest Antiseptic, Disinfectant, Anodyne, Hemostatic, Antiphlogistic, and Germicide for cuts, burns, sores, bruises: Ideal surgical dressing.

Samples and literature sent upon request. Mention this Journal.

Hance Brothers & White

Pliarmaceutical Cliemists

Philadelphia New York Chicago





Everything for Physicians' ractice

SNELL AMERICAN CYSTOSCOPE.

COLD LAMP -- WATER OR AIR DILATATION -- DIRECT VISION

IN THIS INSTRUMENT ARE COMBINED

The successful features of all other American or European instruments constructed for bladder inspection or ureter catheterization, together with the following seven additional important advantages:

First.—BOTH ureters can be catheterized at the same operation through one and the same catheter chamber.

Second.—One-third larger field of vision is obtained than with any other double catheterizing cystoscope of SAME outside calber.

Third.—We give you the same size field of vision as other double catheterizing cystoscopes, but with the SNELL AMERICAN instrument of five sizes smaller caliber.

Fourth.—You can use either WATER OR AIR DILATION easily and successfully with the same instrument.

Fifth—An achromatic lens system giving a large and magnified field without reflexes or rainbow hues.

Sixth.—After BOTH ureters have been catheterized and catheters are entirely outside of cystoscope (see technique) you can examine both ureters and ascertain positively by seeing whether catheters are still in the ureters or not.

Seventh.—The most important and incalculable advantage is that when cystoscope is withdrawn from bladder and urethra, THE CATHETERS ARE NOT WITH-DRAWN (as is generally the case with all other instruments).

These seven very important features are the result of over one hundred actual demonstrations on living subjects, demonstrations which have been made with and for a large number of the most prominent surgeons in the United States, and if you are thinking of purchasing a cystoscope, you cannot afford to consider any instrument which does not give you these advantages.

Manufactured solely by CHICAGO ELECTRO APPLIANCE CO.

67 Wabash Avenue, Corner Randolph Street,

Chicago, Ill.

Mephitic Gases a n d Germs are drawn from the cellar and waste-Every suspicious pipes. spot should be purified and to the water in the furnace occasionally added some Platt's Chlorides, the odorless disinfectant.

A colorless liquid, sold in quart anti-s only. Manufactured by Henry B Platt, New York.

Formula—A combination of the milifited solutions of Chloride Silts proportioned as follows Zn 40 per eent., Pb 20 per cent., Ca 15 14r eent., Al 15 per cent., Mg 5 per cent., K 5 der cent.



ANTISEPTIC ANESTHETIC ANTIPHLOGISTIC

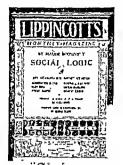
Unique in its properties and in the extent or its application. It is a local anesthetic which saturates and antisepticizes the tissues without injury. It removes pain, subdues nflammation, and absorbs suppuration.

PYROLIGNEINE

In surgery it replaces iodoform and bi-chloride, affording certain advantages all surgeons will appreciate. The clinical reports sent with samples give practical information as to the extent of its application. Drop us a card **NOW** for samples and literature.

SAMPLES FREE

THE PYROLIGNEINE CO., Winchester, Tenn.



Lippincott's Magazine

FOR, 1905

Will be better than ever before. It will aim to amuse and entertain rather than to instruct; not a heavy, dull, or tiresome page will be permitted to weary the reader of LIPPINCOTT'S during the coming year.

The principal feature, as usual, will be the

COMPLETE NOVEL IN EACH ISSUE

Besides the five or six short stories, the poetry, the special articles, the timely papers, etc., etc. Most of the novels that appear in LIPPINCOTT'S are afterwards published in book form and sell for \$1.50 each.

\$18 Worth of the Best Novels for \$2.50, and all the short stories and hundreds of pages of other seasonable and entertaining matter gratis! LIPPINCOTT'S is a bargain at regular price. You will make no mistake in adding it to your list for the coming year.

Lippincott's Magazine \$2.50 Pearson's 1.00 or any one in Class 2 \$2.50 for both	Lippincott's Magazine\$2.50 Booklover's Magazine 3.00 or any one in Class 3 \$ \$3.75\$ for both			
Lippincott's Magazine \$2.50 World's Events 1.00 or any one in Class I Ladies' World	Lippincott's Magazine \$2.50 Ladies' World			
Lippincott's Magazine \$2.50 Woman's Home Companion 1.00 \$2.60	Lippincott's Magazine \$2.50 Int. Dental Journal 2.50 World's Events 1.00 or any one in Class I			
Lippincott's Magazine \$2.50 Successful Farming	Lippincott's Magazine \$2.50 Int. Dental Journal 2.50 Pearson's I.00 for the three			
Vick's Magazine	Lippincott's Magazine \$2.50 \\$5.25 Leslie's Weekly 4.00 for both			
Lippincott's Magazine \$2.50 Cosmopolitan 1.00 for the three	Lippincott's Magazine \$2.50 Atlantic Monthly 4.00 \$5.50			
Lippincott's Magazine \$2.50 Technical World 2.00 for the three	or Harper's Magazine or Harper's Weekly for both Lippincott's Magazine \$2.50			
Lippincott's Magazine \$2.50 Cosmopolitan 1.00 or any one in Class 2 Woman's Home Com-	Judge 5.00 \$5.75 or North American Review (new) or Century Magazine			
panion 1.00 } Lippincott's Magazine \$2.50 Etude (for music lovers) . 1.50 \$3.50	Lippincott's Magazine \$2.50 Scribner's Magazine 3.00 for the three			
or THE MUSICIAN Recreation	For Classes 1, 2, and 3, see our Magazine List on page 2.			
MAKE YOUR OWN COMBINATIONS LIPPINCOTT'S MAGAZINE With any two of Class 1	The International Dental Journal may be substituted for Lippincott's Magazine or any Class 3 Magazine in any combination on this page.			
With any two of Class 2	Prices on any desired combination containing Lippincott's will be given on request.			
With any one of Class 1 and two of Class 2 3.25 With any three of Class 2 3.50 With any one of Class 3 3.75	Write for Quotations on any Magazines or Periodicals not listed above			
With any four of Class 2	LIPPINCOTT'S MONTHLY MAGAZINE 227 S. Sixth Street, Philadelphia, Pa.			

Annals of Surgery

The recognized leading Surgical Journal of the Medical One hundred and sixty or more pages of material invaluable to the medical man and to the Fully illustrated by black and color halfspecialist. Monthly Review of Surgical Science and Practice. Edited by Lewis Stephen Pilcher, M.D., LL.D.

Annals of Surgery \$5.00 \\ Review of Reviews 2.50 \\ Annals of Surgery \$5.00 \\ Pearson's \cdot \cdot \cdot \text{I.00}	Annals of Surgery . \$5.00 Atlantic Monthly . 4.00 North American Review (new) . 5.00			
Leslie's Monthly . I.oo Recreation I.oo Cosmopolitan . I.oo for the five	Annals of Surgery . \$5.00 Art Interchange . 4.00 Century Magazine 4.00 Current Literature 3.00 \$10.75			
Annals of Surgery . \$5.00 Lippincott's Maga- zine 2.50 Cosmopolitan I.00 Twentieth Cen-	Annals of Surgery . \$5.00 World's Work 3.00 Country Life in America 3.00 Harper's Magazine 4.00			
tury Home I.00 Annals of Surgery . \$5.00 Current Literature 3.00 World's Work 3.00 \$7.25	Annals of Surgery . \$5.00 North American Review (new) . 5.00 Century Magazine 4.00 \$14.00 for the four			
Annals of Surgery . \$5.00 Scribner's Maga- zine 3.00 World's Work 3.00 \$8.60 for the three	Ask for quotations on any Journals wanted			
Annals of Surgery . \$5.00 Medical Review of Reviews 2.00 Harper's Magazine 4.00 or Harper's Weekly or Atlantic Monthly	not in above list Address ANNALS of SURGERY 227 S. 6th St., Philadelphia, Pa.			

To the reader of the "Annals of Surgery."

Almost every day the newspapers print something which makes you Want to know more. This information you want right away, and so plainly stated that you don't have to go over it twice to understand it. There is just one way to obtain this: Own an encyclopædia that can be trusted. There are several good English encyclopædias. How shall you choose? They are all fairly comprehensive and accurate.

But put them to another test. Ask. them some questions about the men of the twentieth century. What do they tell you about Santos Dumont, the inventor? about Mutsuhito, the Emperor of Japan? about the newly-made Pope? Or what do they say of the places where the history of to-day is being made—of Dalny, of Corea, of Finland, of Manchuria? Again, what have they about the wonders of invention and discovery of recent years, including 1904? What about wireless telegraphy, flying machines, submarine navigation, radium, the theory of electrons? If any encyclopædia answers satisfactorily such questions as these and is comprehensive and accurate on the facts of history and of useful knowledge of the world generally, it is the book you should buy—if it is clearly printed, honestly bound, and sold at a fair price. Write your name and address on a postal card, mark the letter "M" in the corner of the card, and address it to the "Annals of Surgery," Washington Square, Philadelphia. We have something on this subject Which will interest you. We will send it to you free.



JAMAICA

WHERE SUMMER IS 12 MONTHS LONG

An increasing number of tourists and health seekers who wish to escape the harsh Northern Winter are yearly choosing Jamaica. Its gentle climate, gorgeous tropical scenery, outdoor recreations and splended hotel accommodations offer unusual inducements to the sojourner.

Nowhere can winter be spent so delightfully

THE UNITED FRUIT COMPANY'S Steel, Twin-Screw U. S. Mail Steamships

Admiral Dewey

ADMIRAL SCHLEY

sail weekly from Boston and Philadelphia, Steamships BROOKLINE and BARNSTABLE weekly from Baltimore. The passage down the coast is the favorite short ocean voyage.

Round Trip Fare, \$75 {\text{lucluding meals}} Single Fare, \$40

Write for Jamaica literature describing and illustrating the Island and tours of interest.

Address Division Passenger Agent,

United Fruit Company, Long Wharf, Boston: 5 North Wharves, Philadelphia; Hughes & Henry Sts., Baltimore
Raymond & Whitcomb Co. Thos. Cook & Son. Tourist Agents

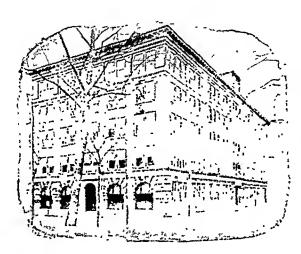
The manufacturing departments

of the

ANNALS OF SURGERY

have exceptional facilities for illustrating, printing, and binding medical and surgical works, school and college catalogues, and hospital, asylum, and insti-

tutional reports.



The proof-reading department is especially well qualified to correct, revise, and prepare for press medical publications of every description.

A specialty is made of the print-

ing of fine editions of memoirs and monographs for private distribution and of biographical, historical, and genealogical works.

Also binding in every variety from the plainest cloth to the finest Levant morocco, either of single volumes or of complete libraries.

Manuscripts, models, drawings, and photographs sent for estimate or publication are kept in fire-proof vaults.

Correspondence concerning the manufacturing of every description of book or pamphlet work solicited and given prompt attention.

ANNALS OF SURGERY,
227–231 South Sixth St.,
Philadelphia, Penna.



Modern Chemical Research

Has shown that Carbohydrate Metabolism is the fundamental process of the human economy. By it energy, and the force of human effort are made possible.

The potent principle in malt extracts is Diastase, which is the most active known aid to Carbohydrate Digestion, and its metabolism.

This is the reason why

Pabst Extract

the most perfect malt extract, has been found, during many years of use by medical men, to be the most satisfactory tissue builder at their disposal.

It can always be depended on to perform this particular task, and perform it well.

Pabst Extract Laboratory Milwaukee, Wisconsin.

For Subacute and Chronic Inflammation

(Especially of the vagina or urethra) the most satisfactory results follow the use of



It is always convenient, easy of application, comforting to the patient, effective as a deodorant, absolutely to be relied upon as a powerful, non-poisonous germicide and antiscptic, with local anæsthetic properties in the treatment of severe cuts, wounds, SULPHO-NAPTHOL has immense advantages over carbolic acid, in that it may be used with freedom in all the natural cavities of the body.

> WE WILL GLADLY SEND SAMPLE AND LITERATURE TO ANY PHYSICIAN MENTIONING THIS JOURNAL

THE SULPHO-NAPTHOL CO., BOSTON, MASS. 46 HAYMARKET SQUARE, -

NATIONAL LINES OF

MEXICO

National Railroad Company of Mexico Mexican International Railroad Interoceanic Railway of Mexico

3300 Miles Under One Management

THREE ROUTES TO MEXICO

Laredo-Eagle Pass-Veracruz

For Time Tables, Rates, and other information, address:

W. F. PATON, Gen'l Eastern Agt., 11 Broadway,

G. R. HACKLEY, Gen'l Western Agt., 230-235 Quincy Bldg., New York, N. Y. Cor. Clark and Adams Sts., Chicago, Ill.

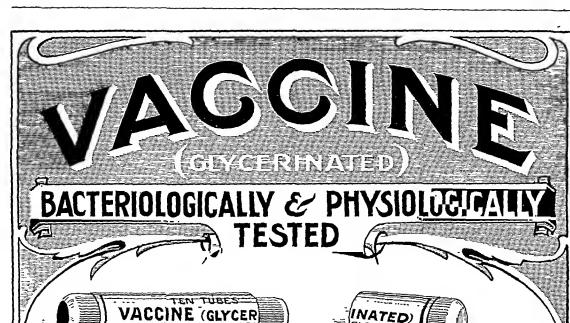


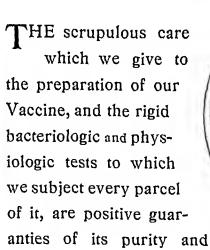
THE "Colorado Short Line," ...DIRECT TO ... Glenwood Springs, Colorado Springs, Man

Famous Resorts & Rockies.

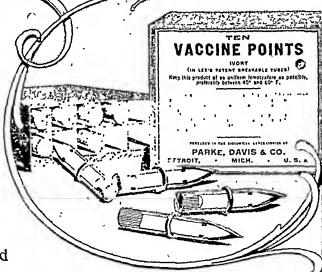
Elegant Pullman Sleeping Cars, Observation Parlor Cafe Dining Cars, with Electric Lights and Fans, and Free Reclining Chair Cars.

W. E. HOYT, G. E. P. Agt., 335 Broadway, N.Y.





activity.



TUBES AND POINTS.

Capillary Glass Tubes, hermetically sealed, boxes of 10 tubes and 3 tubes.

Ivory Points, each in a Lee's breakable glass case, hermetically sealed, boxes of 10.

Specify "P., D. & Co." when ordering.

PARKE, DAVIS & COMPANY

LABORATORIES: DETROIT, MICH.; WALKERVILLE, ONT.; HOUNSLOW, ENG.

BRANCHES: NEW YORK, CHICAGO, ST LOUIS, BOSTON, BALTIMORE, NEW ORLEANS, KANSAS CITY, INDIANAPOLIS, MINNEAPOLIS, MEMPHIS; LONDON, ENG.; MONTREAL, QUE.; SYDNEY, N S W.; ST. PETERSBURG, RUSSIA; SIMLA, INDIA; TOKIO, JAPAN.

Operative Surgery

By J. F. BINNIE, A.M., C.M. (Aberdeen),

Professor of Surgery, Kansas City Medical College; Fellow of the American Surgical Association.

SYNOPSIS OF CONTENTS:

Head and Neck.—Skull and Brain; Frontal Sinus; Tic Doloureux; Upper Jaw; Lower Jaw; Cheek; Lower Lip; Hare Lip; Cleft Palate; Tongue; Parotid; Rhinoplasty; Torticollis; Cervical Tumors; Cervical Sympathetics; Rebro-Pharynx; Oesophagus; Pharyngotomy; Laryngotomy; Laryngectomy; Tracheotomy; Goitre. Thorax.—Breast; Chest. Abdomen.—Stomach; Intestines; Appendicitis; Rectum; Pancreas; Spleen; Supra-renals; Liver; Biliary Passages; Hernia; Umbilical Hernia. Genito-Urinary System.—Kidney; Ureter; Bladder; Perineal Section; Epispadias; Hypospadias; Testicle. The Extremities.—Dupuytren's Contraction; Club Foot; Flat Foot; Hallus Valgus; Metartarsalgia; Tenotomy; Tendons; Veins. The Spine. Unclassified Topics.—Abscess; Drainage; Nerve Suture; Principles of Plastic Surgery; Ligatures; Sutures.

With 559 Illustrations, a number being Colored. 12mo; about 576 pages. Full Flexible Leather, Gilt Edges, Round Corners, \$3.00 net.

P. BLAKISTON'S SON & CO., Philadelphia

Subscription Price Reduced to \$3.00 per Annum

The AMERICAN JOURNAL of ORTHOPEDIC SURGERY

THE OFFICIAL PUBLICATION OF THE AMERICAN ORTHOPEDIC ASSOCIATION

EDITORIAL COMMITTEE:

R. W. LOVETT, M.D., Boston. H. AUGUSTUS WILSON, M.D., Philadelphia. A. H. FRIEBERG, M.D., Cincinnati.

A Journal issued for Orthopedic Surgeons, but appealing largely, also, to the General Surgeon and Practitioner.

ISSUED QUARTERLY.

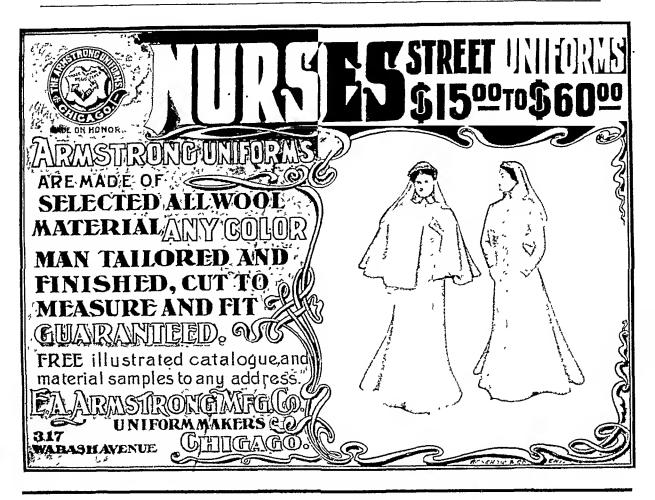
Subscription Price, \$3.00 per Annum, in Advance.

All matters pertaining to Subscriptions and Advertisements should be addressed to

P. Blakiston's Son & Co., 1012 Walnut St., Philadelphia

BY WHOM "THE AMERICAN JOURNAL OF ORTHOPEDIC

SURGERY" IS NOW PUBLISHED FOR THE ASSOCIATION



LIGNOL in Surgery

Powerful Non-Caustic Antiseptic

NATURAL OIL

Equal to 1-1000 Solution Bichloride Mercury Used in all Suppurative Conditions Ulcers, Abscesses, Sinuses, etc. Endometritis, Cervical Catarrhs, Granular Erosions Fistulas

Skin Diseases

The most perfect lubricant for Sounds and Speculums

A trial of this **Natural Oil** will demonstrate its usefulness. Literature and samples promptly furnished on application.

LIGNOL SOAP

Antiseptic Superfatted Dermatological Soap

Makes the most efficient, the most readily used, also the cheapest douche for the treatment of **Leucorrhoea**.

THE GIRARD COMPANY, Inc.

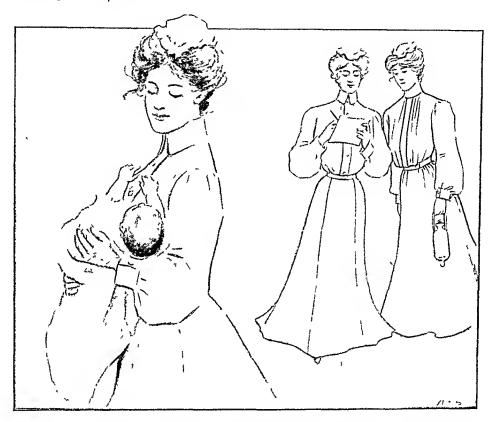
Pharmaceutical Chemists

1308 Sansom Street :: Philadelphia, Pa.

When writing, please mention Annals of Surgery.

Our Special \$2.00 Nurse's Dress

Made of plain blue chambray, or of superior gingham in stripe effect—blue, pink or gray, with white. Regulation full skirt, five-gore with deep hem gathered on to a one-inch band. Waist has plain back, and full front with box plait; buttoned cuffs. An unequaled value at the price—\$2.00.



Two=piece Nurses' Dresses, \$3.50

Made of excellent white duck. Five-gore skirt with deep hem. Waist has plain back and full front, bishop sleeves—\$3.50. The same Dress, made of white linen, with shirt waist and skirt—\$5.00.

THE BEST VALUES EVER OFFERED IN NURSES' DRESSES CORRESPONDENCE SOLICITED

Strawbridge @ Clothier

Philadelphia, Pa., U. S. A.

A. H. ALTSCHUL

71 PARK PLACE, N. Y. CITY

MAKER OF ALL KINDS OF BRUSHES



FOR HOSPITALS'
AND INSTITUTIONS' USE

ALSO

BED PAN BRUSH

Best adapted for bed pans. Straight handle, pure, stiff bristle.

Price \$5.50 and \$6.50.

URINAL BRUSH

Made of pure, stiff bristle, with metal handle, 18 inches long. Will stand boiling and sterilizing. Curved so as to reach all parts of the Urinal. This is the best Brush on the market for cleaning Urinals.



Price per Dozen

No. 215. 26-inch handle, 1/2 inch thick, made of pure, stiff mule	
hair	\$12.00
14 inch thick	9,00
Same as above, made of horse hair:	
No. 217. ½ inch thick	9,00
No. 218. 1/4 " " ,,,,,	6.00

RADIATOR BRUSH

This is the only Brush of its kind for getting in between the coils of Radiators, cleaning them thoroughly.

Price per Dozen

No. 345. Large, \$5.50 No. 346, Med'm, 5.00 No. 347. Small, 4.50 No. 350. Same as stylo 345, bnt solid back and stiffer, large size only.....6.50

Price per Dozen No. 220. Straight Handle, 27 inches long, stiff bristle...\$12.00

No. 221. Curved Handle, 27 inches long, stiff bristle. . 15.00 No. 222. Straight Handle, 27

inches long, mixed bristle, 9.00 No. 223. Curved Handle, 27 inches long, mixed bristle, 12.00 The Straight Handle is the stronger.



NAIL BRUSH

Made of best Russia bristle. Only waterproof Brush on the market. Doctors' favorite.



NAIL SCRUB

Price per Gross

No. 355. Large, \$3.50 No. 356. Med'm, 3.00 No. 357. Small, 2.50

These Brushes are used in every hospital in the country. Sold by druggists for 5 and 10 cents each. My price, less than 2 cents.

4½x1¼ inches price, less than 2 cen.

Made of stiff Tampico. Best
for Surgical work.

SANITARY BRUSH



USED FOR HOPPERS OR WATER-CLOSETS

The only perfect Brush for cleaning Sinks, Hoppers, and Toilets.

THE FOLLOWING ARE A FEW OF THE BRUSHES I MANUFACTURE

						- 1111111011101	
Bath	Brush	Feeding Tube	Brush	Mops, Dry		Tooth	Brush
Bottle	44	Flesh	**	Serub	Brush	Tumbler	11
Bottle Graduation	ng"	Floor	44	Shaving	64	Wall	44
Combs, Fine		Floor Oil		Shoe Polish	ers "	Whisk Brooms	
" Coarse		Furniture		Shoe Daube		Window	14
Cornice	••	Hair	4.6	Sink	4.4	Wool Dusters	
Corn Brooms		Mattress	4.	Stair	41	Wool Floor Dust	ers
Counter	44	Mops, Floor		Stove	**	Wool Wall Duste	
Cuspidor	14	Mops, Dish		Test-Tube	**	Wax Welghted	13
Dust	14	- ·					

Don't Forget the Name A. H. ALTSCHUL, and Always Address to 71 PARK PLACE, Cor. Greenwich, NEW YORK

ANASARCIN

RELIEVES

Valvular Heart Trouble

by reducing number of heart beats, giving the heart rest, increasing the force of the Systole, causing valves to close more thoroughly, thus preventing regurgitation, relieving the dyspnæa and increasing heart nutrition.

Cirrhosis of the Liver

by equalizing the circulation, dilating the arterioles, thus relieving obstruction in the branches of the hepatic artery and portal radicles, securing better circulation in the liver and more nutrition to the cells and interlobular connective tissue.

Ascites and Anasarca

by causing resorption of the effused serum into the circulation, whence it is easily eliminated with salines.

Exophthalmic Goitre

by its inhibitory power over the cardiac fibres of the pneumogastric, controlling the heart's action indefinitely without detriment, thus preventing enlargement, or restoring to normal if already enlarged, the thyroid arteries and the vessels behind the globes which cause prominence of the eyeballs a d enlargement of the thyroid gland, both of which are consecutive to the eardiac disorder.

Bright's Disease

by its power to relieve distal engorgements through its wonderful equalizing effect on the circulation, dilating the arterioles and establishing a normal physiological balance between arterial and venous systems.

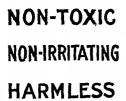
Sample and Literature to Physicians

Address

THE ANASARCIN CHEMICAL CO.

WINCHESTER, TENN., U. S. A.

Messrs. THOS. CHRISTY & CO., London Agents





ANTISEPTIC DISINFECTANT DEODORANT

Dioxogen is a medicinal solution of H₂O₂with a well established: reputation for purity and reliability. It has for many years been known as the kind that keeps and is always specified by the careful prescriber.

Dioxogen

H, O, 3%

It is a powerful germicide, but is harmless to healthy tissues; destroys pus and septic materials; has a mechanical action which dislodges dirt from accidental wounds. Of indispensible value in modern minor surgery. Adhered dressings easily and painlessly removed by its use.

SHOULD ALWAYS BE CARRIED IN THE EMERGENCY BAG.

THE OAKLAND CHEMICAL CO. NEW YORK CITY

Catgut Casualties

are ever present surgical risks and always happen when most to be dreaded

Suppuration
Stitch Abscesses
Secondary Hemorrhage

You can reduce them to an innocuous minimum by employing only the

"Van Horn" Catgut

Its Sterility is absolute.

Its Tensile Strength is certain.

Its Absorbability is a known quantity.

All sizes, both plain and chromicized, in hermetically sealed tubes.

VAN HORN & SAWTELL LONDON, ENG. NEW YORK, U. S.A.

